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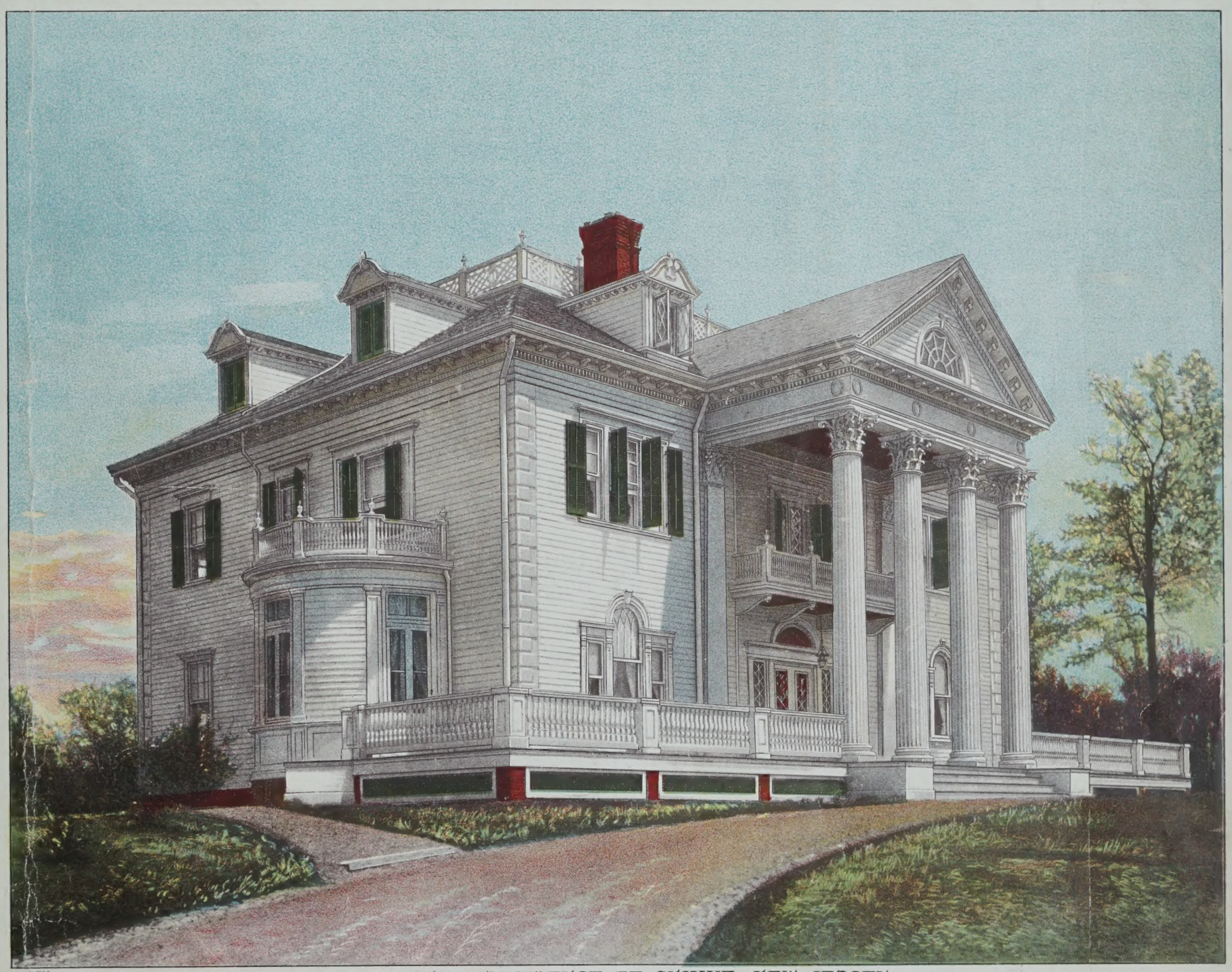

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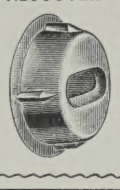

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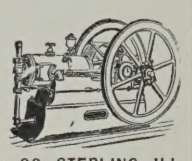

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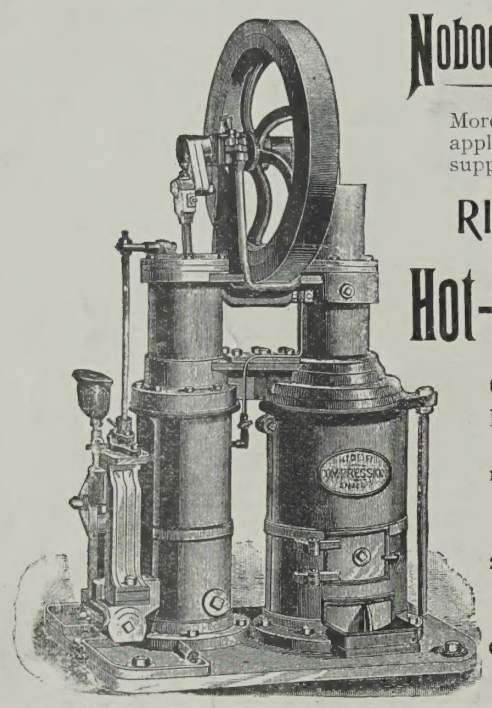

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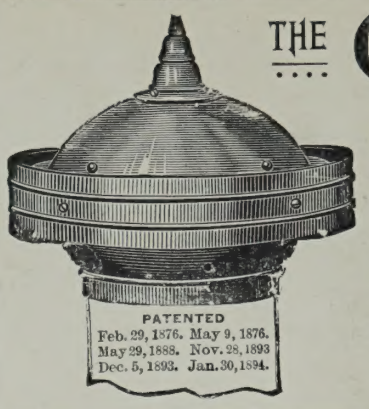

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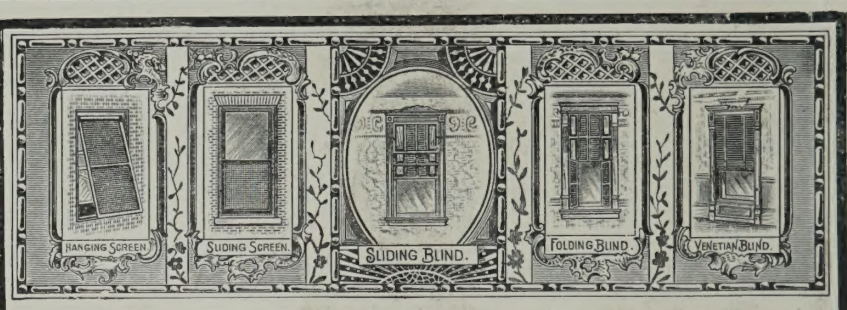

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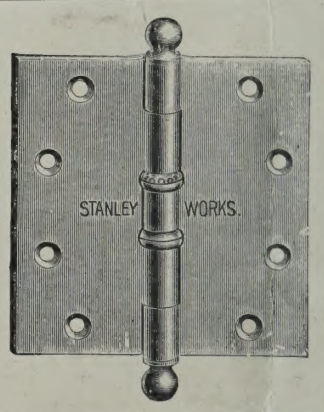

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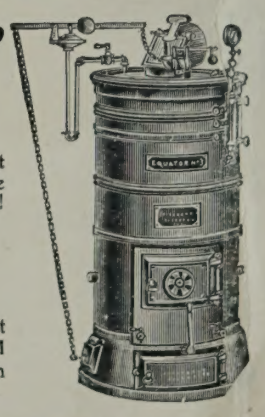

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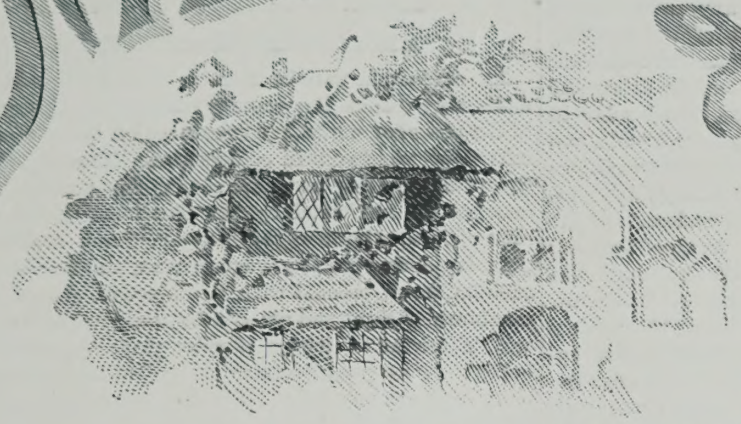

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CANAL IN THE GARDEN OF THE VILLA AT POGGIO A CAJANO, NEAR FLORENCE.

ITALIAN GARDENS.—See page 2.

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NEW YORK, JANUARY, 1900.

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THE BUILDING CODE OF NEW YORK CITY.

AFTER many hearings the new Building Code of New York city has been gotten into shape and has finally passed the Municipal Assembly, and the new ordinance makes a pamphlet of considerable size. It will go into effect on December 23, 1899. Many architects and representatives of architectural societies appeared before the Building Commission of the City of New York, and gave their views on the subject of the regulations which will govern the construction of the buildings in the great city. The newspapers have not failed to criticise the weak points of the new Code. Nearly $200,000,000 worth of building operations per annum is affected by the new regulations, so that the Building Code is really of vast importance.

The new Code is substantially the building law of 1892, under which an enormous number of buildings have been constructed. The Code is far from being revolutionary and is not essentially new. Its purpose is to establish a set of regulations which shall insure the safe and sanitary construction of buildings. The Building Code Commissioners had before them a problem somewhat similar to that which is constantly confronting the architect, only naturally they could not specify, as can the architect, the particular systems and makes of materials desired. Of course, the framers of the Building Code could not establish too high and too costly a standard of building, so that under it discretionary powers are conferred upon the Commissioners of Buildings. It is, of course, necessary to frame the Code in such a way that new systems or devices could be adopted without jeopardizing the safety of buildings in any way, and, of course, without working an injustice to the makers of new materials which may be placed on the market. On the whole the Building Code hardly deserves the many criticisms which have been passed upon it. The basis of it is the old law under which buildings have been constructed for many years, only amended and modified very largely to meet modern conditions, and it is based upon the recommendation of architects, engineers, builders and others who are familiar with the building trades, and who are in a position to give expert advice regarding the matter; and while not perfect, it probably answers the purpose as well as any set of rules which could be formulated, and certainly the number of accidents due to defective construction which have occurred in New York city in the last few years have been very small.

After the preliminary requirements are stated and definitions given as to the class of building, the quality of materials is considered. Then come the questions of excavations, foundations, walls, piers, partitions, vaults, areas, cellars, beams, girders, columns, chimneys, stairs, flues, entrances, skylights, floor lights, heating, gas, water, electricity, roofs, cornices, tanks, elevators, fire apparatus, fire-escapes, fireproof shutters and doors, public buildings, theatres, places of assemblage, iron and steel construction, floor loads, strength of materials, plumbing, drainage, and many other points. The sections devoted to iron and steel construction and fireproof buildings are most interesting and exhaustive.

Hereafter every building erected or allowed to be used as a hotel, lodging-house, school, theatre, police-station, hospital, asylum, or other institution, the height of which exceeds 35 feet, and every building which exceeds 75 feet in height, shall be fireproof. That is to say, they will be constructed with walls of brick, stone, Portland cement, concrete, iron, or steel, in which wood beams or lintels shall not be placed, and in which the floors and roofs shall be of materials provided for and approved in the appropriate section of the Code. The stairs and staircase landings shall be built entirely of brick, stone, Portland cement, concrete, iron, or steel. No woodwork or other inflammable material shall be used in any of the partitions, furrings, or ceilings in any such fireproof buildings, excepting when the height of the building does not exceed 12 stories, or is more than 150 feet high; the doors and windows, and their frames, the trims, the casings, and the interior finish, when filled solid or backed with fireproof material, and the floor boards, and sleepers directly thereunder, may be made of wood, but the space between the sleepers must be solidly filled with fireproof material, and extend up to the underside of the floor boards. When the height of the fireproof building exceeds 12 stories, or is more than 150 feet high, the floor surfaces must be of stone, cement, rock asphalt, tiling, or similar incombustible material, or the sleepers and floors may be of wood treated by some process approved by the Board of Buildings which will render the same fireproof. All outside window frames and sash must be of metal, or of wood covered with metal. The inside window frames and sash, doors, trim, and other interior finish may be of wood covered with metal, or of wood treated by some process approved by the Board of Buildings which will render the same fireproof. All the hall partitions or permanent partitions between rooms in fireproof buildings must be built of fireproof material, and must not be started on wood sills nor on wooden floor boards. The regulations relating to fireproof floors are most elaborate, and would seem to prevent any accidents on account of either fire or water. This section of the Code is admirable. The portions relating to iron and steel construction are also most minute, and deal with the smallest points connected with the details of the subject, and, if they are carried out with a strict enforcement of the law, very satisfactory results may be looked for.

GARDEN CITIES.

THE aspect of England to-day is vastly different from the scene that could be observed a hundred years ago, and in most cases practically the same conditions obtain in the United States. The creation of industries in certain areas affords many conveniences and secures advantages in production which are not likely to be lost sight of, but with the growth of such hives of industry are associated many evils and some nuisances apparent to those whose business is in great cities and growing towns. In England an association has been formed which professes to find a remedy for many of the inconveniences. Although the enthusiasts who have formed the new association are naturally optimistic and their measures may seem somewhat Utopian, there is the basis of good common sense underlying all, and certainly the town of Pullman, which is probably the most remarkable and successful attempt to build a model town, is fulfilling the intentions of its promoters. A definite proposition has been made to purchase 6,000 acres somewhere in England, to be developed in a remarkable manner, and already the scheme has a considerable backing. The idea is to arrange the town in a circle, building a segment at a time. The center is to be a small circular garden of five acres, which is the meeting point of six streets which radiate in all directions. Facing the garden will be the town hall, museum, hospital, library, theater, and concert hall. In the triangular space between the two streets at the rear of the town hall is the central park, and then come the regular streets of the city, all of which are curved, with the exception of those which have radiated from the central garden. One of them, which is termed "Grand Avenue," consists of a series of hemicycles joined, which will lend variety. On the outer edge of the circle will be the factories; all will be terminated by the railroad, which will also run in a curve. Beyond this will be dairy farms, large farms, etc. It would be most interesting if a scheme of this kind would be tried in either England or America, and its promoters consider the scheme feasible; and certainly one of the most important, if not the most important subject to human beings, is the character of the environment in which they are to live and thrive, and if necessary the adequate environment can be created. More practical, says "Industries and Iron" (from which we derive our information), in the way of brightening industrial towns, is another association which is being vigorously promoted by Sir W. B. Richmond. Instead of commencing on the ground, he starts from the top, and, by threatening those who cause smoke nuisances, hopes to clear London of one of its terrors. Nearly 1,000 observations have been made in six parishes, and this led to the reporting of 530 nuisances, and the vestries have proceeded against 60 cases, and in 23 of them the nuisances were immediately abated, and in 32 great improvement has resulted. Fines to the aggregate amount of 200 pounds sterling were imposed. This was all done by the labor of one inspector, and the committee hopes to extend observations and operations in order to effectually clear the atmosphere of London. Many of our own cities are very much in need of societies of this nature, notwithstanding the fact that good work has been done in New York and other cities by the Boards of Health. The stranger is prejudiced against a great city like Philadelphia or Pittsburg upon seeing the heavy pall of smoke lying constantly over it, and any attempts to modify what is perhaps a necessary evil should be warmly encouraged.

A MOVE FOR BETTER TENEMENTS.

AN exhibition will be held in New York and other cities throughout the country beginning this month, of the plans for model tenements which have been submitted by architects in competition. The Charity Organization Society announces that the purpose of the competition instituted by the Tenement House Committee, is to stimulate the interest of the architect in planning houses for low-wage earners, and to show that such buildings, erected with the object of obtaining the maximum of light and air, can be made to pay the owners. After the exhibition of prize plans, the committee hopes to induce architects to design buildings along the lines suggested by them. For the best plans a prize of $500, for the second best a prize of $200, and for the next best plans a prize of $100 each is offered. No more than 70 per cent. of the lot is to be covered, leaving the remainder for air-shafts and open courts. The fire regulations must be complied with, dividing the buildings into compartments by fire walls, and supplying fireproof staircases and fire-escapes. There must be plenty of air and no narrow, damp court. The prize plans will be exhibited at the Paris Exposition of 1900.

EXHIBITIONS OF HANDICRAFT.

THE new National Arts Club, in New York city, has already given abundant proof of its right to exist, for, notwithstanding the fact that its opening was coeval with the completion of the Dewey Arch, it has already held three most interesting exhibitions. First, articles in gold and silver; second, of small pictures; and third, of pottery. The first and last were decidedly interesting. A great deal of work is being accomplished every year by small art concerns and individuals, but their products are usually sold either to collectors or to large dealers in jewelry and bric-à-brac, so that an opportunity to display their industry is lost. It is seldom that adequate opportunities are provided for the exhibition of the products of one concern. There are quite a number of potteries in the United States of which we hear little or nothing, and which, if they were abroad, would be places of pilgrimage, and their wares would be eagerly sought for. These potteries are scattered about the United States: at East Hampton, L. I., New Orleans, Cincinnati, Boston, Dedham, and other localities.

Some of the effects of color are most remarkable, and the gold leaf untarnished under the glaze, from the "Middle Lane Potteries," at East Hampton, is superb. The decorations of all the pieces, wherever they are applied, are admirable, but the distinguishing feature of most of the pieces seems to be their shape and superb coloring. The exhibition shows that the ceramic industry is in a healthy state in America, and needs only proper encouragement. The next exhibition will be one of small bronzes, and will be followed by carvings in ivory and wood, stained glass and art glass, mosaics and mural decorations, American embroideries, and rustic textiles, silks, brass and copper works, objects in mother-of-pearl, and cabinet work.

ITALIAN GARDENS.

A BEAUTIFUL villa in a fair landscape garden makes one of the most delightful scenes of the cultivated earth. This is only true if the garden be artistic, and unfortunately it is one of the rarest things in the world to find such a garden. To be really effective the artificial or formal garden requires to be laid out with the greatest possible care by an artist, and it is for this reason that the beautiful gardens of the Renaissance in Italy are so celebrated. For century after century Italy has produced artists who have given their serious attention to all the small matters of life as well as in the creation of palaces, statues, or great mural paintings.

The Italians were the initiators of the artistic movement of the Renaissance, and to-day these gardens are considered by modern landscape architects to be masterpieces. They are not only plantations destined to give shade and to assemble rare flowers, but were arranged to give a chance for a promenade. They afford a majestic decoration around a villa or château. Art is combined with nature to produce a most graceful and grandiose effect, and they were laid out with the true feeling for art. All of the gardens of the Renaissance in Italy were planned following a regular method, and this is not strange when we consider the architecture for which the garden served as a setting. The architectural lines are strongly accentuated by the plantations. One finds in these gardens specimens very little altered of the best creations of the Renaissance. There are still the same disposition, the same ornamentation, and almost the same

flora. The gardens of Italy present the rich and picturesque quality of modern gardens without their puerile simplicity. They are planted regularly around the villa, and it is always by an artistic progression that the house is reached. In Italian gardens nature is assisted by art, and art is not used entirely in their creation. These gardens give exactly the same idea of country houses of which we hear so much from classic writers; as, for instance, Lucullus in the gardens of Sallust, the gardens of Pliny, Cicero, etc. They have their modern counterparts in those of the Villa Albani, Pamfili-Doria, the Aldrobrandini, etc.

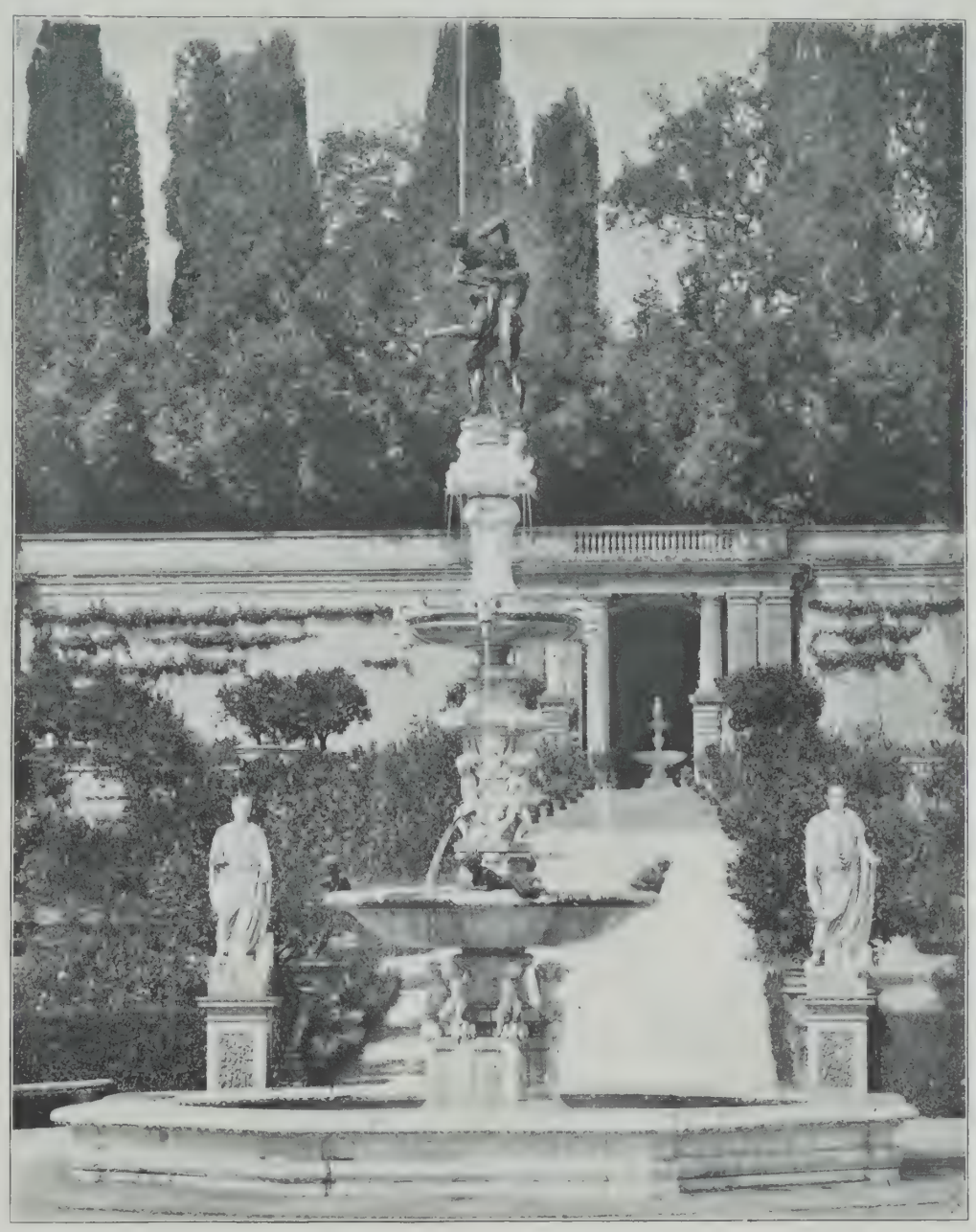
If one studies the plans of these villas and those of the Barberini, Borghese, and d'Este, one will notice that the artists have not been dominated by the thought of making a symmetrical design, but that in adapting the lines of the plantations to the house itself, their principal object, they have largely concerned themselves with making use of the natural disposition of the ground as they find it, and devote a large part of their energies to achieving well-studied perspectives, intended to be viewed either from the house or from important points of the promenade. The design of the garden was not made solely with a view to the principal effect, for minor views were arranged for, but the grounds were laid out in such a manner that there were a number of interesting parts ably brought together so as to form a homogeneous design. Each detail is a picture sufficiently detached from the ensemble to be of value by itself. Each particular composition is justified by usage, and every work has its decorative quality which demonstrates its right to exist. Placed in well-chosen sites, nature has imposed few obstacles to the creation of a beautiful composition, and even furnishes the principal means for accomplishing remarkable effects. The great terraces shade those walking on stately promenades from the direct rays of the sun, and connect with one another by straight or circular paths. Broad staircases ornamented with balustrades, vases, and statues give a noble and elegant aspect to the gardens. Beautiful fountains are constantly playing, and the sparkling water contrasts with the green of the foliage. The beautiful parterres and avenues are usually provided with statues, arches, and columns. These decorations taken from architecture and sculpture seem entirely in place in Italian gardens, although they do not appear as much so in the gardens of the north, where the light is less intense and the climate less propitious.

It was not until the golden age of the Italian Renaissance, when architecture had well-nigh attained perfection, that new form was given to the principles which had once been embodied in the classic Roman villa. In many cases the villa itself and the gardens were designed by the same master, who was at once architect, landscape architect, and sculptor. The Italian gardens are constantly noted in the literature of the Renaissance, and even the scenes in Boccaccio's masterpiece are laid in an Italian garden in the environs of Florence. In some of them were scientific collections, such as botanical and zoölogical specimens, as in the parks of Lorenzo de' Medici, the botanical collection being kept at the villa at Careggi, where he breathed his last, and the zoölogical collections at Poggio a Cajano, of which we show a fine view, page 1. The greatest architects and sculptors did not feel that it was beneath their notice to devote great attention to such gardens. It will be remembered that the National Sculpture Society, at their two interesting and important exhibitions, in both cases turned the gallery of the Fine Arts Building into an Italian garden, which was a perfect bower of beauty, and showed how advantageously statuary could be displayed. In connection with this subject the Newport gardens in our November issue will be remembered.

Tivoli is an ideal spot for a villa, and this fact was fully realized by the Romans, for many of them, including Mæcenas and the Emperor Augustus, founded beautiful villas there. Under Hadrian the splendor of the place attained its climax, and in the Middle Ages it participated in the fate of Rome. The Villa d'Este, page 15, is the masterpiece of Pirro Ligorio, and was originally begun by the Bishop of Cordova. The quantity of water employed to adorn the grounds, and the variety of its treatment, show a reminiscence of the Moorish gardens of Spain. The villa is interesting architecturally on account of the ingenious construction of the terraces and the ramps which connect the palace with the gardens below it. The charm of the gardens is in their atmosphere and the mass of the grounds which is in shadow. At present the trees have grown to a great height, and the once trim hedges are no longer well kept, and the garden is an unkempt wilderness. The sound of trickling, splashing water and the singing of the birds lend variety to the scene. From almost any part of the gardens can be obtained wonderful views of the Campagna. Unfortunately, access is now denied except to those who may be acquainted with its owner, who is a high ecclesiastic.

It is not only in the south that we have specimens of beautiful villas, but also in the north, as, for instance, in the splendid alley of trees and statues at a villa near Vincenza, of which we give an engraving on page 15.

In the environs of Florence there are many fine villas, and we present two illustrations on page 1 and below. The Villa Reale di Castello, near Florence, is located in a beautiful park, and our engraving shows the fountain of Hercules and one of the flights of steps leading to a terrace. Unlike the Villa d'Este and the Roman gardens, water is not used in so much profusion, but in Rome and Tivoli water was supplied in such vast quantities by the aqueducts that it could be used very freely. The Villa of Poggio a Cajano lies near Florence, and was built for Lorenzo the Magnificent by Giuliano da San Gallo in the simple rustic style, and it is surrounded by a splendid old park, and commands a beautiful view of the mountains which surround the valley of the Arno. It was not always the case when the Italian gardens were laid out that terraces, fountains, and statues were the sole means of decoration; occasionally whole parks were left as nature had planned them. On the first page is shown the beautiful canal at Poggio a Cajano, the trees arching over the narrow body of water making one of the prettiest pictures imaginable, as seen in our illustration.



FOUNTAIN OF HERCULES AT THE MEDICEAN VILLA OF CASTELLO, NEAR FLORENCE.

A RESIDENCE AT LARCHMONT, N. Y.

WE present on page 5 in this issue a residence which has been erected for Mr. A de Cordova, at Larchmont, N. Y. The design presented has many attractive features, and is treated in an excellent manner in the Dutch Colonial style. The underpinning is of stone. The exterior framework above is sheathed, papered, and covered with shingles left to weather finish, while the trimmings are painted cream-white. The roof is shingled and treated similar. Dimensions: Front, 56 ft.; side, 37 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The interior arrangement is most excellent. The reception hall is treated with white and silver enamel. It contains a paneled wainscoting, and ceiling beams, an open fireplace with mantel of white Roman brick and terra-cotta. It also contains an ornamental stairway, turned out of quartered oak. The parlor is trimmed with curly birch, with Empire mantel and decorations. The den trimmed with birch is treated in the Moorish style. It contains an open fireplace with tiled facings and mantel. The dining-room is trimmed with quartered oak. It has a paneled wainscoting and timbered ceiling, parquet floor, mantel of brick and terra-cotta, and a nook for sideboard. The kitchen and pantries are most excellently arranged, are provided with plenty of dressers, cupboards and drawers, and are complete in every respect. The second floor contains four bedrooms, sewing-room and bathroom. The principal rooms of this floor are trimmed with oak, while the remainder is finished with cypress. The bathroom is tiled, including floor, wainscoting, side walls, frieze and ceiling, and it contains porcelain fixtures and exposed nickel-plated plumbing. The third floor contains five fine bedrooms, three of them being reached from front stairs, and the two servant rooms from rear stairs, the rear stairs isolating servants from main house. The basement contains the laundry, servants' bathroom, and store cellar complete. The house is heated by steam, lighted entirely by electricity, and has a complete system of bells and tubes. The whole building is most complete. Mr. George Palliser, of No. 32 Park Place, New York, was the architect and superintendent.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN RESIDENCE AT SPRINGFIELD, MASS.

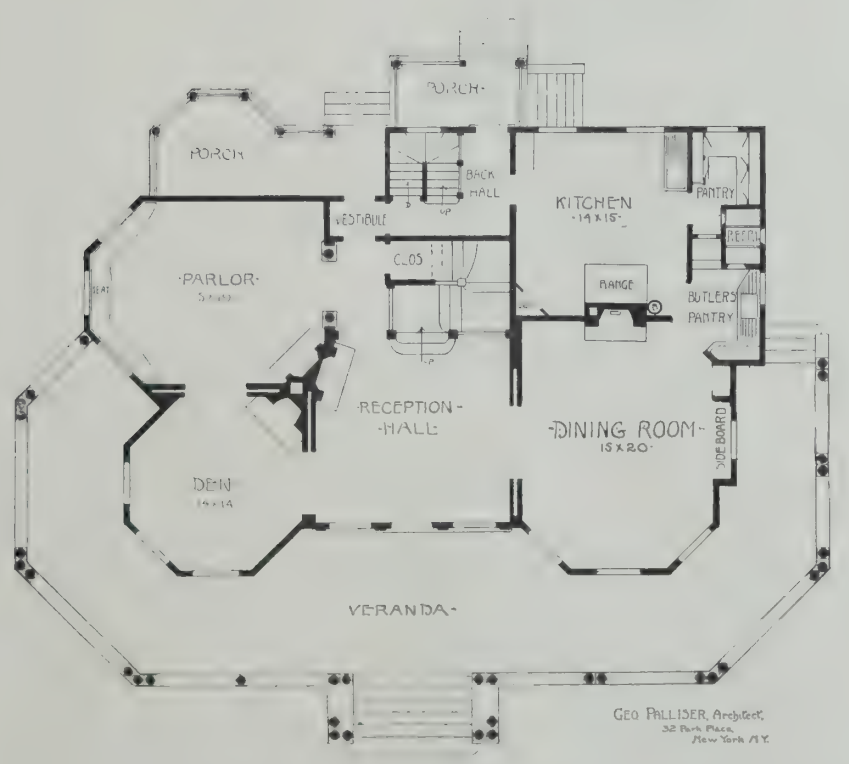
THE engravings shown on page 8 illustrate a modern residence which has been erected for A. D. Smith, Esq., at Springfield, Mass. The building is treated in the Colonial style, and though square in outline it has an attractive porch with Colonial columns and Ionic capitals. The underpinning is built of red brick laid up in red mortar.

The superstructure of wood is covered with clapboards, and painted yellow with ivory-white trimmings. The roof is covered with shingles and stained moss green. Dimensions: Front, 26 ft.; side, 31 ft., not including porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft.; third, 8 ft. The hall, or living-room, is an attractive apartment, and is trimmed with whitewood, stained and finished in mahogany. This room contains an open fireplace, with hearth and facings of dark green tiles and a mantel of cherry. On either side of fireplace are placed Dutch seats with lids, making ample space for storage of fire logs. The staircase is a combination one, and is ornamented with newel posts, balusters and rail. This living hall and library are separated by an archway with paneled base and Colonial columns rising up and supporting a beamed arch. The library is treated with a similar finish. Both rooms have oak floors, highly polished, and walls covered with green paper with Colonial wreaths in gold, which with the mahogany woodwork gives a very rich harmony of color. The dining-room is trimmed with whitewood and is finished in antique oak. It has a plate shelf which surrounds the wall, and a cluster window with a stained glass transom which is quite unique. The kitchen and pantry are wainscoted and furnished with all the best improvements. The second floor contains three bedrooms, one of which has a nook with paneled seats, den, and bathroom, the latter having a medicine closet, porcelain-lined tub, other fixtures and exposed nickel-plated plumbing. This bathroom also has an art glass window. The bedrooms are painted in harmony with the color scheme of walls. A cemented cellar contains furnace room, laundry, and other necessary rooms. Mr. Louis F. Newman is the architect, 21 Elm Street, Springfield, Mass.

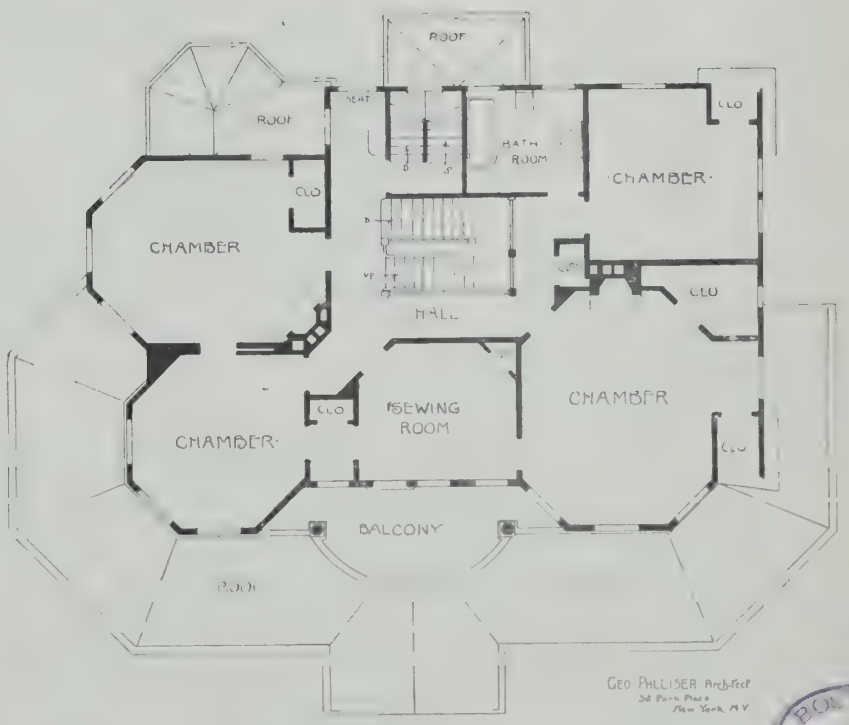
Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL RESIDENCE AT SUMMIT, N. J.—See page 17.

MESSRS. HOPPIN & KOEN, ARCHITECTS.



First Floor.



Second Floor.

A RESIDENCE AT LARCHMONT, N. Y.—See page 3.

MR. GEORGE PALLISER, ARCHITECT.

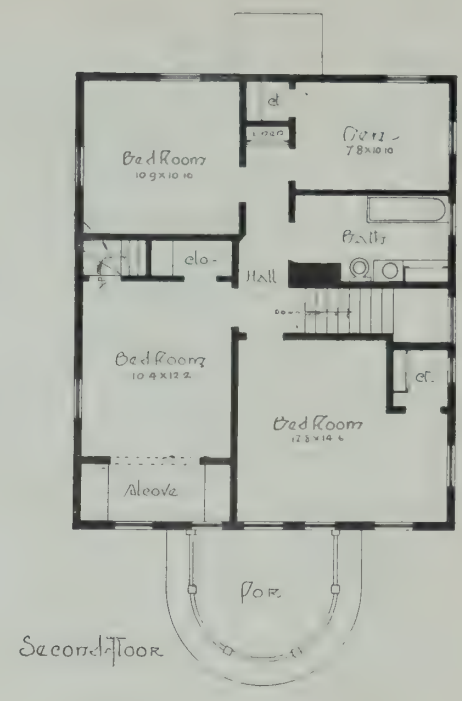
Second Floor Plan.

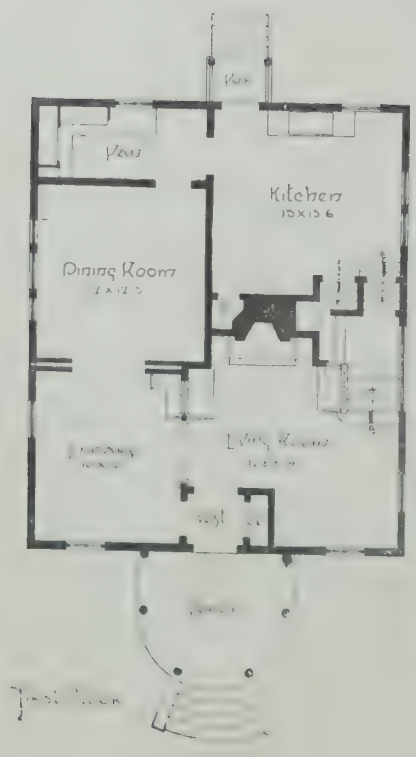
A RESIDENCE AT SPRINGFIELD, MASS.—See page 16.

MR. G. WOOD TAYLOR, ARCHITECT.

A RESIDENCE AT SPRINGFIELD, MASS.—See page 16.

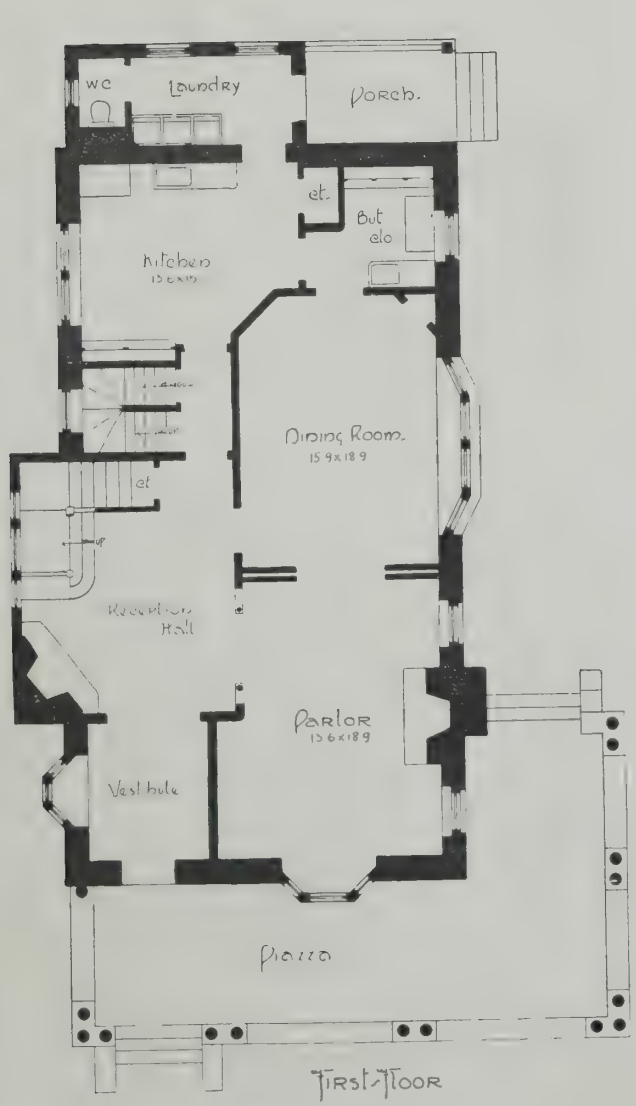
MR. G. WOOD TAYLOR, ARCHITECT.





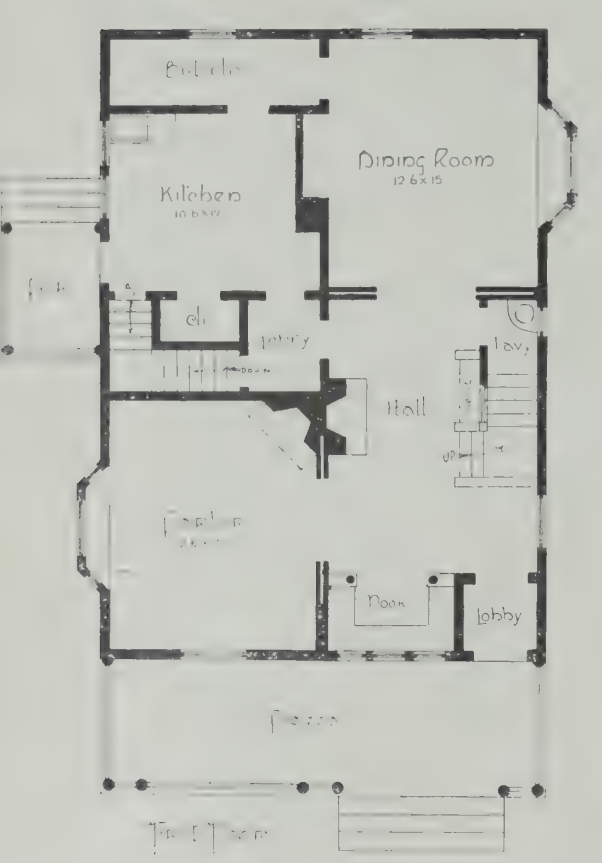
A MODERN RESIDENCE AT SPRINGFIELD, MASS.—See page 3.

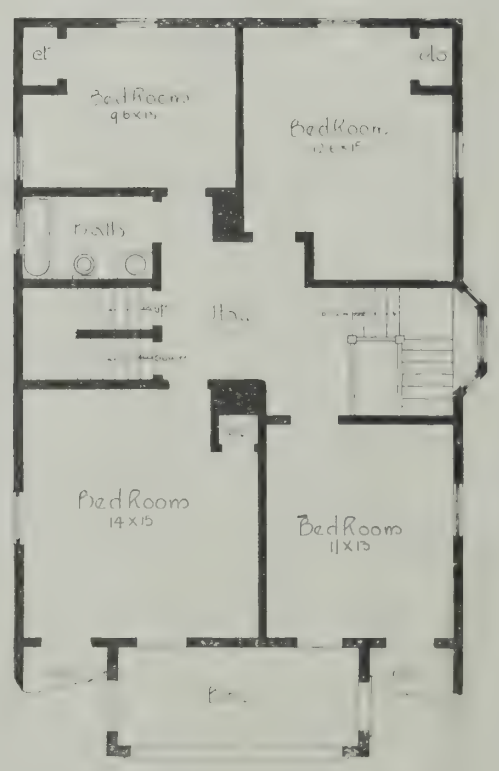
MR. LOUIS F. NEWMAN, ARCHITECT.



A COLONIAL RESIDENCE AT OVERBROOK FARMS, PA.—See page 17.

MESSRS. WENDELL & SMITH, BUILDERS.

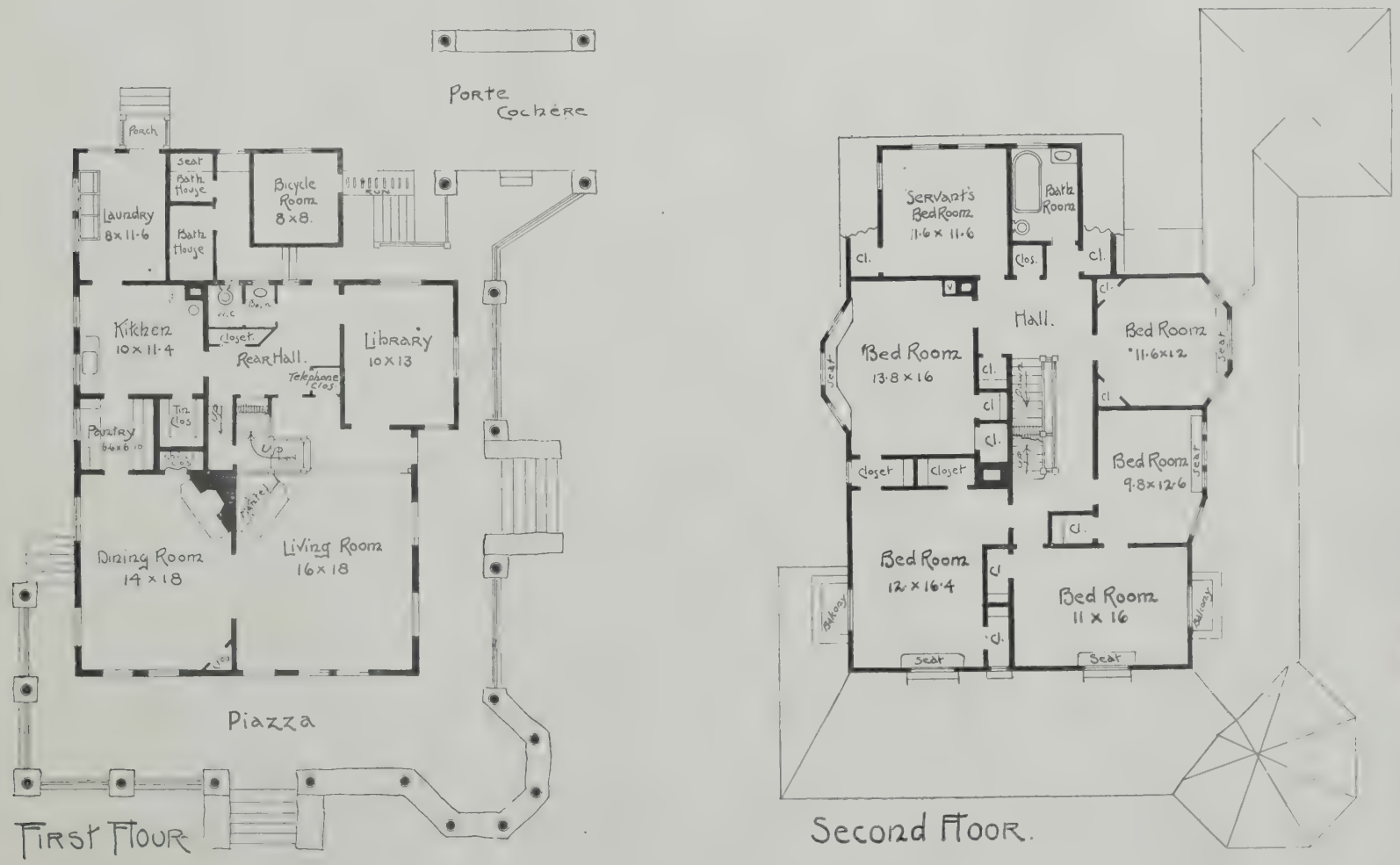




Second Floor

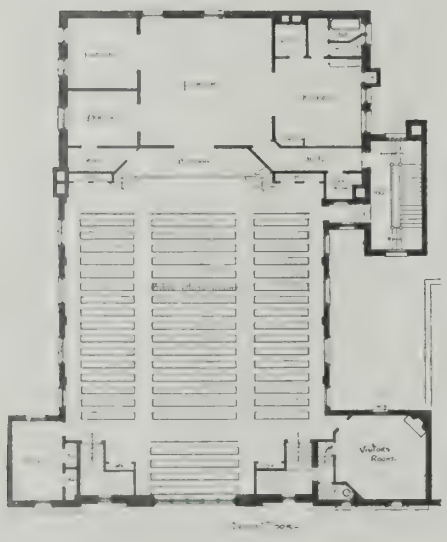
A MODERN DWELLING AT SPRINGFIELD, MASS.—See page 17.

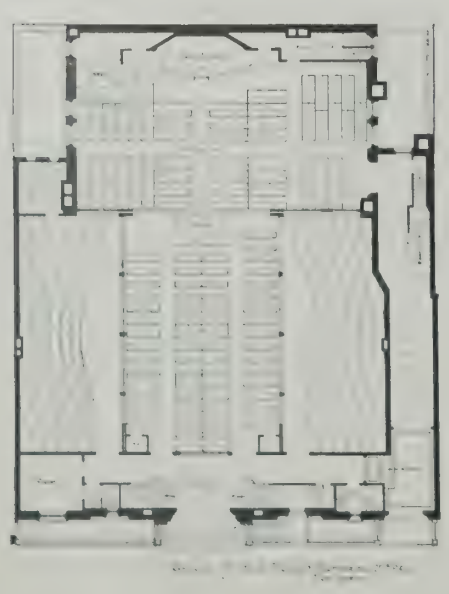
MESSRS. J. D. & W. H. McKNIGHT, ARCHITECTS.



A MODERN SUMMER HOME AT CRESCENT BLUFF, PINE ORCHARD, CONN.—See page 17.

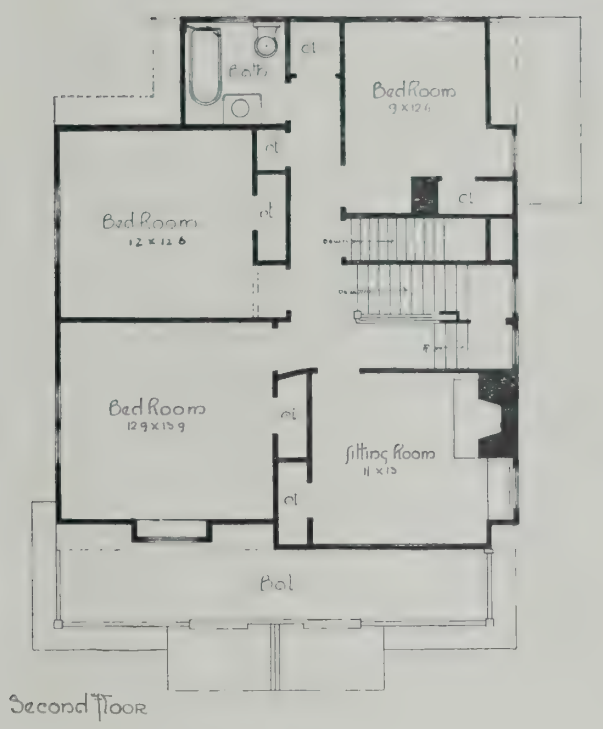
MESSRS. BROWN & VON BEREN, ARCHITECTS.

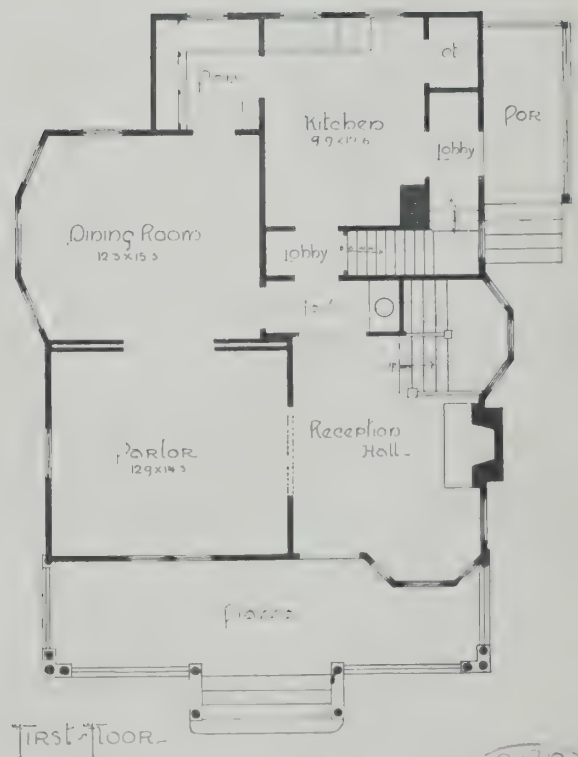




THE KNOX MEMORIAL CHAPEL, NEW YORK CITY.—See page 16.

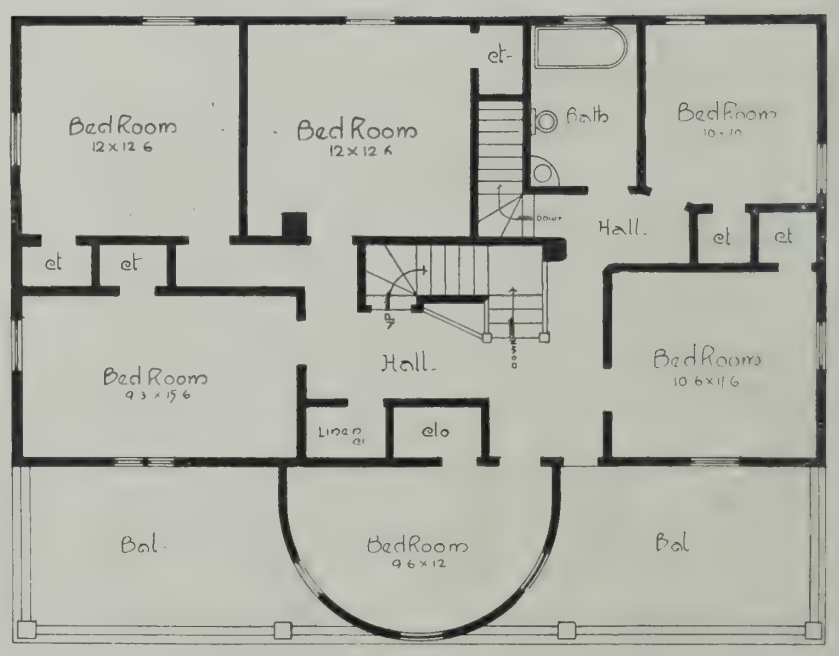
MR. EDGAR K. BOURNE, ARCHITECT.





A MODERN RESIDENCE AT FOREST PARK HEIGHTS, SPRINGFIELD, MASS.—See page 17.

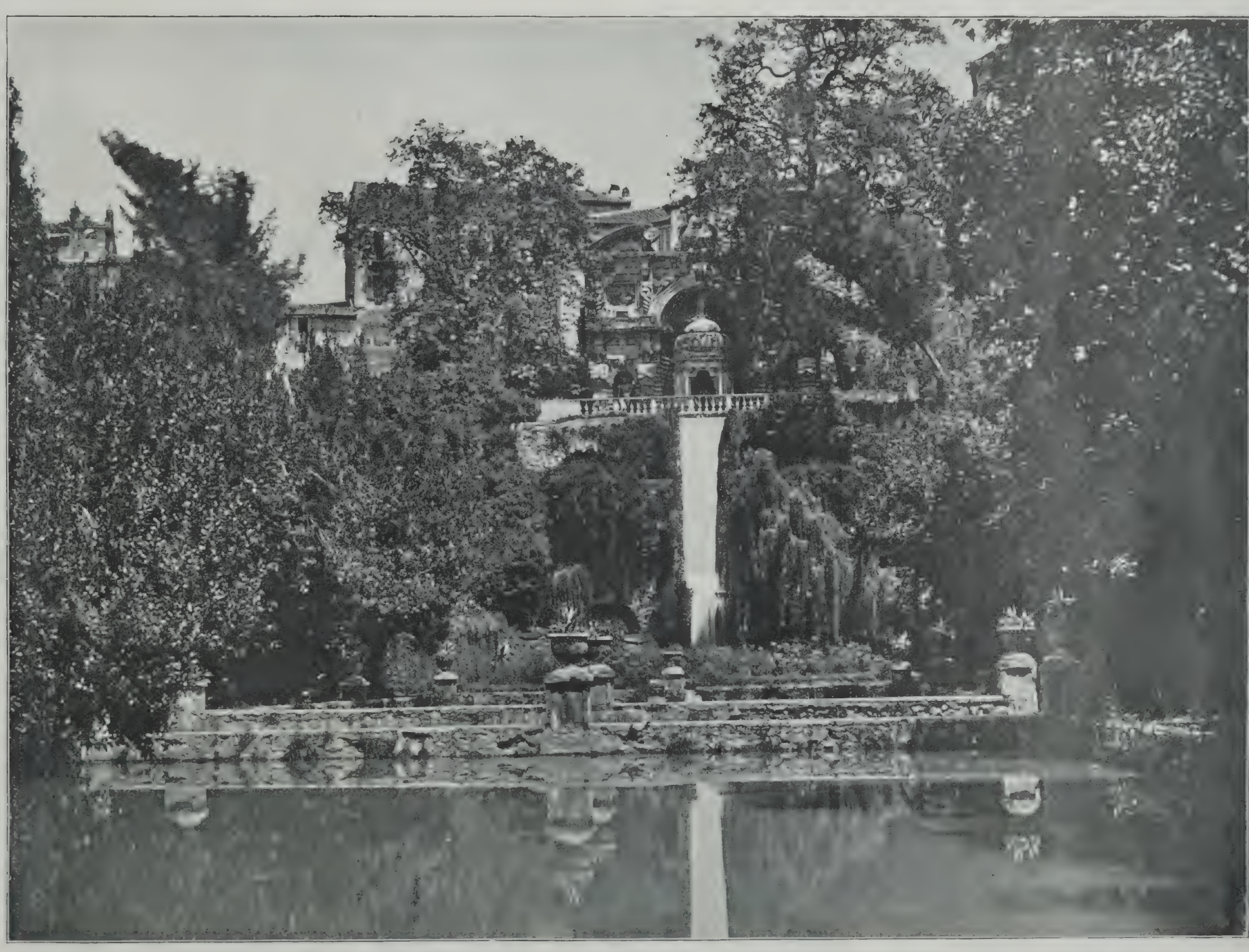
MR. E. A. STURTEVANT, ARCHITECT.



A MODERN RESIDENCE AT SOUTH HAVEN, MICH.—See page 17.

MR. A. M. WORTHINGTON, ARCHITECT.

VIEW IN THE GARDEN OF A VILLA NEAR VICENZA.



VIEW IN THE GARDEN OF THE VILLA D'ESTE AT TIVOLI.

ITALIAN GARDENS.—See page 2.

THE KNOX MEMORIAL CHAPEL.

THE engravings shown on page 12 illustrate the Knox Memorial Chapel, which has been erected on West Forty-first Street, near Ninth Avenue, New York city. This chapel is built on a plot of ground 84 ft. on the street and 98 ft. 9 in. in depth. The front is of Indiana limestone, and in style is a modern adaptation of the perpendicular Gothic. The face of the stone work around the windows, angles, arches, etc., is tooled, while that of the body work is laid up in random ashlar, and is crandalled. The roof slopes are covered with red slate. The cross on steeple is 90 feet above the sidewalk. The central section, which includes the two towers and large gable, is built the full depth of the lot, the rear part being three stories in height and the front part only two stories high. The sections at either side are extended back 20 ft. for two stories and 72 ft. for the first story, thus forming ample courts for light and air on both sides. Windows in the central section open on these courts, and skylights are provided in the roof of the first-story rooms not having windows. A wrought-iron fence 7 ft. high surrounds the front area. The building is arranged for manifold forms of church work which for convenience of reference are herewith enumerated. On the first floor are the church, Sunday-school, infant and intermediate class-rooms, chart room, robing room and lavatories. On the mezzanine floor are the Sunday-school and church galleries, library, pastor's study and lavatories. On the second floor are the Bible class room, visitors' room, Employment Society's room and store closets, and the girls' club rooms. The gymnasium is on the third floor rear, and the boys' club rooms, bowling alleys, motor room, coal room, etc., are in the basement. The principal entrance door from the street opens on the main hall, which is 10 ft. wide and extends across the front of building on both the first and mezzanine floors. Two stairways each 5 ft. wide start at either side of this entrance and extend up to the mezzanine and second floors. Double doors oper directly into the main Sunday-school room, which is 30 x 47 ft., and also into both the intermediate class-room at the right and the infant class-room at the left. Both of these class-rooms are 20 ft. 6 in. x 47 ft. Separating the class-rooms from the Sunday-school room are very heavy paneled doors, each 11½ ft. wide and 8½ ft. high, arranged to slide down in pockets in the basement. These doors, weighing 600 pounds each, are most easily operated by one person, and in effect form an elaborate wainscot for the side walls of the room. The Sunday-school room is provided with benches built of oak frames and birch veneered seats and backs, and rubber-tipped legs. They are symmetrically arranged in three banks divided by two aisles, and of varied lengths for dividing into classes of eight, ten, or sixteen members. The Sunday-school seats 300 on the main floor. The infant and intermediate class-rooms are each built with six elliptical-shaped banks of seats on stepped platforms facing the Sunday-school room. By lowering the doors between them, both classes and the Sunday-school can be assembled together. These rooms seat 250 each. Directly opposite the class-rooms in the main hall and under the stair platforms are placed lavatories and toilet rooms fitted with the most approved fixtures set on tiled floors. At west end of main hall is the teachers' meeting-room, with door into lavatory, 11 x 12 ft. 6 in. in size. The church proper is at the extreme rear, and is reached through the eastern door and connecting corridor. The front vestibule has a mosaic floor and white marble steps up to main hall. Large double doors glazed with plate glass open on corridor and also on main hall. Electric push buttons communicate with the pastor's study, visitors' room and motor room in basement. At rear of corridor is the eastern staircase up to the gallery, girls' club rooms and gymnasium. The vestibule, corridor, and staircase are all fireproof. The walls are built of brick, floors of steel beams and brick arches, and the stairs and platforms of slate and iron. A small passage connects this hall, at their respective levels, with the Sunday-school gallery and the Bible class-room, and makes of it a convement fire-escape for all parts of the building. The church is 35 ft. from rear of chancel to south wall, and 58 ft. in width. It seats 300. The chancel is on the north, the organ and choir occupying the space to the left, and the robing room that on the right. The steel plate girders which carry the structure above the church are incased appropriately in wood, and with the additional boxed hammer-beams and tracery form a roof effect architecturally required. The organ is incased in a skeleton frame of oak, especially designed to harmonize with the detail of the woodwork elsewhere, and filled in with pipes decorated with aluminum leaf. The south wall between church and Sunday-school room and class-rooms is built with an elliptical opening, 27 ft. wide and 20 ft. high, filled in above the spring of arch with Gothic tracery and leaded glass. Below are five sliding doors, 14 ft. high, also elaborated with tracery and leaded glass, each with two lancet sash hung by hinges. If it is desired to hold a service in which the congregation, Sunday-school, and both classes can all participate, the sliding doors are moved back into the pockets on either side, the windows between classes and church are opened top and bottom into pockets provided for them, and the lancet sash in doors opened, the latter gauging exactly with the open windows in the wall. When the doors between classes and Sunday-school are lowered as mentioned previously, an audience of 1,300 can thus be assembled and addressed directly from the church pulpit. The gallery, seating 60, is on the eastern side of the church. This side is lighted by four large windows on the east court. The western side is lighted by three lancet windows, divided appropriately with Gothic tracery and filled with richly colored leaded glass. The large middle window is a memorial to Rev. Abraham Thompson. The most noticeable and beautiful feature of the church is the large chancel window, a memorial to Mrs. Anna Townsend Van Santvoord, and her son, Charles T. Van Santvoord. This window, representing Christ walking through a field of lilies, adds a marked beauty and embellishment to the architectural surroundings. The pulpit and choir are made of quartered oak, and are carved and paneled with similar detail. A communion table of quartered oak, beautifully wrought and carved, occupies the space directly in front of the pulpit. This table is a memorial to Miss Anna Louisa Van Vechten. The church and chancel walls are wainscoted four feet high, capped with parapeting in miniature, the chancel wainscot having in addition carved trefoiled panels. The pews are stationary, with paneled ends, and all of cypress. All the floors in the building are laid double, the upper floor being of the very best end grain yellow pine, which in the church is varnished three coats. The walls of the church are tinted a very light green, which forms a pleasing contrast with the warm tones of the colored windows and the woodwork. Directly over the eastern door in front is the pastor's study, 17 x 18 ft., with mantel, fireplace, closet, bookcases, and other furnishings. It has windows on the street and rear court. Electric bells connect with the vestibule and motor room. Directly over the teachers' room at the opposite end is the Sunday-school library, fitted with bookshelves and accessories, and with windows front and rear. The lower part of the large front window lights the mezzanine platform, which is 10 ft. wide, and has double doors opening on to the Sunday-school gallery. In this window the Seal and Coat of Arms of the Corporation, the Alpha and Omega, and other emblems are reproduced in colored and enamel glass, with pleasing effects. The Sunday-school gallery is built on two levels and will seat a total of 180. The classes on the upper level have a clear view of the superintendent's platform over those in front, and, when the sliding doors are rolled back, of the pulpit also. The railing around front of gallery is built with boxed open panels, filled in with turned balusters, and is enriched with dentiled moldings and carved corbels under. The Sunday-school room is lighted by rows of windows in the gallery on the east and west courts. From the mezzanine floor, the front staircases continue up either side to the second or Bible class floor. The Bible class-room is 42 x 65 ft., and 14 ft. high. It is lighted by windows along the east and west courts and by the upper part of the large front window. It is furnished with benches, seating an audience of between 700 and 800 persons. Over the library at the west end is the Employment Society's room, 10 x 16 ft., with two large store closets. At points around the large room are six closets for uses of the society's various committees. Over the study at the east end, with door leading from stair platform, is the visitors' room, 17 x 18 ft., with large closet, mantel and furnishings, and with windows front and rear. Electric bells connect this room also with the vestibule. At the extreme rear of the second floor, above the church, are situated the girls' club rooms. These consist of a large parlor, 26 x 25 ft., and two smaller parlors, 14 x 14 ft. and 12 x 14 ft. respectively, besides a kitchen, 17 x 17 ft., pantries, lavatories, toilet-room, bath and cloak rooms. The parlors are completely furnished for the particular needs of this branch of work, and have varnished floors covered with rugs. The kitchen, which is used for teaching cookery, is fitted with dumb-waiter to basement, range, dressers, and other necessary appointments. The clubrooms are reached, as before mentioned, from the eastern staircase. The height of ceilings in these rooms is 10 ft., the difference between that and the 14 ft. ceiling of the Bible class representing the extra height of the church below over that of the Sunday-school room. Double doors open out from the large parlor on to the Bible class platform, which affords a convenient arrangement when it is desired to hold receptions or to entertain a large number of persons. The gymnasium occupies the extreme rear, and is the only part of the building that is carried up three stories. It has, therefore, windows on all four sides, and is a dry, airy, and bright room, 36 x 60 ft., with a peak roof, 22 ft. high, supported on four wood and iron trusses. In the northeast corner are the toilets and lavatories, and the shower room, the latter with six showers and needle bath. Adjoining is the locker room, and around the walls of gymnasium are fitted modern appliances and all necessary apparatus for gymnasium uses. From the stair hall a door opens out on the flat roof over the Bible class room. The structure is built with sufficient strength to support a third story over this part, if such may be desired in the future. It is adapted for use as a roof garden, or other purposes that may assemble a large number of people. The walls and ceilings of all halls are tinted in water-color paint, excepting a dado six feet high, which is done in oil paint. The halls and stairways, excepting the fireproof stairs, are covered with a handsome pattern of cocoa matting, the entrance halls being laid with loose strips of brown linoleum. The church aisles, chancel, and other smaller rooms are all covered with Wilton velvet carpet. The front basement is devoted to the uses of the boys' club. It is reached from the street through iron gate and tower door, and wide stairway. From inside a door from main hall opens on stairway. Here are two rooms, 16 x 21 ft. and 20 x 23 ft., with connecting hallway 10 ft. wide, lavatory, and toilet-room. Opening off from this hallway are double doors into the large open basement, which is 10 ft. high, is concreted, and perfectly dry. A portion of this space, extending clear through from front hall to rear wall, is reserved for two standard length bowling alleys, with a 15 ft. run. Iron stairs from street down to basement door are provided, with bicycle runway at side. Under the eastern corridor are the large coal storage room and passage from motor room to front area. At rear, under east side of church, is the motor room, 17 x 35 ft., with two large windows opening on court. Here are situated the motor, fan-blower, workbench, closets, etc. The building is heated and ventilated by means of two sectional boilers of ample capacity, and a 110-inch steel plate blower fan with a blast wheel 66 inches in diameter. The blower is driven by means of a 10 H. P. electric motor capable of two speeds. All small rooms and halls are heated by direct steam radiators. The assembly-rooms are heated by means of steam coils located at basement ceiling, connected by large galvanized iron trunks with registers placed high up on the walls of the various rooms, and, where required, by auxiliary direct steam radiators in addition. Low down on the walls of these rooms are placed registers opening into ducts extending up and out through the roof. The pure warm air is thus forced into the upper part of the rooms, and as it becomes cooler and vitiated falls, and is forced out through the exhaust ducts to the roof. In summer weather, when heat is not required, the blower only is used. The building is piped throughout for gas lighting, and wired for electric lighting, the latter being ordinarily used. All fixtures are combination gas and electric. The church, Sunday-school, and Bible class rooms are all wired on four separate circuits, permitting four different degrees of brilliancy. All rooms, both large and small, have the light controlled by switches placed in boxes in convenient positions, the small rooms having a wall switch near the entrance door in addition. A boiler is provided in basement for the especial purpose of furnishing hot water to the shower room and all lavatories. All the plastering is done with patent cement plaster having an extra hard surface. The woodwork throughout is of cypress, varnished and rubbed down to a smooth, dull surface. It is all finished by hand after leaving the mill and before being varnished, and wherever possible was put together and varnished before coming to the building. The architect's detailed drawings for the carvings, molded work, and, in many instances, the intricate and accurate constructive adjustments, have been carefully followed, with gratifying results. No space is lost, but all is utilized for the maximum amount of usefulness, convenience, and comfort of the various departments. Mr. Edgar K. Bourne, architect, No. 18 Broadway, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT SPRINGFIELD, MASS.

WE present on pages 6 and 7 in this issue a modern country residence which has been erected recently for John A. Hall, Esq., at Springfield, Mass. The building is a model of architectural good taste; it is treated in the English style in a most effective manner. A happy combination is made of brick and stucco with half timbered work. The underpinning and first story are built of two kinds of brick, with dressed sandstone trimmings. The building above is beamed, and the spaces are filled in with stucco work. The roof is covered with shingles. Dimensions: Front, 82 ft.; side, 47 ft.; not including porch. Height of ceilings: Cellar, 8 ft.; first story, 11 ft.; second, 10 ft.; third, 9 ft. The interior plan is arranged in a most excellent manner, and it is finished off in a substantial and artistic style. The vestibule is trimmed with quartered oak, and has a tiled floor. The front porch has also a tiled floor. The main hall, treated in the English style, is trimmed with quartered oak. The walls are paneled with oak, and the ceiling is heavily beamed, forming deep panels. The staircase has massive newel posts, handsomely carved. This staircase is lighted effectively by a cluster of stained-glass windows, and is provided with bay window thrown out with seat. A lavatory and coat closet are located beneath stairway. This hall also contains an attractive nook with seats, and a side entrance and hall, which are reached by ten risers up from the level of main floor. The library at the level of this side hall is trimmed with quartered oak and is provided with a paneled wainscoting

four feet in height, and an open fireplace with tiled facings and hearth, and mantel elegantly carved. The parlor, trimmed with mahogany, has a paneled wainscoting and an open fireplace with tiled trimmings and mantel. A paneled seat is placed at side of same. The sitting-room is trimmed with quartered oak, and it also has a paneled wainscoting and fireplace. The dining-room is trimmed with quartered oak. The walls and ceilings throughout are paneled and beamed. It has an open fireplace, trimmed with unglazed tile and wrought iron, and a carved mantel. A small bay window with leaded glass lights and seat is thrown into dining-room at the level of first landing of main staircase. The floors of first story are of quartered oak. The butler's closet and kitchen are trimmed with hard pine, and each apartment is fitted up with all the best modern conveniences. The second floor contains six bedrooms, large closets, and two bathrooms. The bedrooms are treated with white enamel. The bathrooms have floors paved with unglazed tiles, and a wainscoting of marble five feet in height. These bathrooms are provided with porcelain fixtures and exposed nickel-plated plumbing. The fireplaces on second floor have tiled facings and hearths with mantels, the whole of which is in harmony with the trim of each apartment. The third floor contains several guest bedrooms, besides the servant quarters, reached by a private stairway. A cemented cellar contains laundry, furnace-room, and all the necessary rooms for a well-appointed house. Cost, about $35,000 complete. Mr. G. Wood Taylor, architect, No. 425 Main street, Springfield, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL RESIDENCE AT SUMMIT, N. J.

IN this issue, we present, on page 4, a residence of Colonial treatment, which has been recently completed for W. J. Curtiss, Esq., at Summit, N. J. The design shown in the engraving presents a pure example of the early Colonial style of architecture of the classic order. The outlines of the building are square in form, but the circular bay windows and the massive frieze and cornice which surround the building, give the whole an expression and relieve it from its severity. The portico at front, which gives the principal character to the building, is supported upon massive Corinthian columns, with capitals executed with the most minute detail to their highest perfection. Another feature worthy of note is the broad terrace and balustrade, which run across the front and side. Dimensions: Front, 70 ft.; side, 72 ft., not including piazza or terrace. Height of ceilings: Cellar, 8 ft.; first story, 11 ft.; second, 10 ft.; third, 8 ft. The entrance is into a large vestibule, with paneled walls; double doors, with windows on either side, in the Colonial style. The great hall, which occupies the central portion of the house, is treated in the old Colonial style, in white enamel. The walls have a paneled wainscoting and a massive wood cornice. The walls are decorated in a rich shade of red, creating a harmonious effect. The grand staircase, starting with a broad central run, rises up to a landing, from which rises one short round to second story. The newel posts are of handsome design, and also the spindle balusters. The parlor, or reception room, is treated with white enamel and red walls. The fireplace is built of buff brick, with hearth and facings, and a mantel of Colonial style. The library is trimmed with cherry, and contains bookcases built in, and an open fireplace, treated same as one already described. The children's study is treated in white enamel, and the walls are decorated in blue. It has also an open fireplace with buff hearth and facings and mantel of Colonial style. The dining-room is trimmed with oak, and has massive ceiling beams and a paneled wainscoting. A feature of this room is the bay window angle, designed in the Moorish style by Tiffany. The butler's closet and kitchen and its apartments are finished off in a substantial manner, and are fitted up complete with all the best conveniences. The second floor, treated with white enamel in the Colonial style, contains six bedrooms and two bathrooms, the latter wainscoted and treated in white enamel, and provided with porcelain fixtures and exposed plumbing. The third floor contains servant rooms and ample storage. A cemented cellar contains laundry, furnace-room and other necessary apartments. Messrs. Hoppin & Koen, architects, No. 160 Fifth Avenue, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN RESIDENCE AT FOREST PARK HEIGHTS, SPRINGFIELD, MASS.

The engravings shown on page 13 in this issue illustrate a modern residence, which has been erected for A. P. Janes, Esq., at Forest Park Heights, Springfield, Mass. The design is treated in the gambrel roof style with Colonial detail. It has many excellent features. The underpinning is built of brick laid up in red mortar. The superstructure of wood is covered with sheathing, paper, and clapboards, painted a light buff with ivory white trimmings. The roof is covered with shingles and stained a dull shade of old red color. Dimensions: Front, 30 ft.; side, 33 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The reception room, or hall, is trimmed with selected quartered oak. It contains a bay window, an open fireplace furnished with green tiled hearth and facings, and a Colonial mantel with plate glass mirror. The staircase is of handsome design, and rises up to a broad landing which is thrown out into a bay window at side. The parlor is trimmed with pine and is treated with white enamel and gold. The dining-room is trimmed with quartered oak. The kitchen and pantries are well fitted up with the usual fixtures of approved kinds, and is wainscoted and trimmed with yellow pine. The upper hall and sitting-room are trimmed with ash. This floor contains also three bedrooms, five closets and bathroom. The sitting-room has a window seat and an open fireplace trimmed with yellow tiled facings and hearth and a Colonial mantel. The bathroom is wainscoted and trimmed with cherry, and is furnished with porcelain fixtures and exposed nickel-plated plumbing. The bedrooms are treated in white enamel. The third floor contains two bedrooms and ample storage. The cemented cellar contains furnace, laundry and other necessary rooms. Cost, $3,700 complete. Mr. E. A. Sturtevant, architect and builder, 159 Dwight Street, Springfield, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN RESIDENCE AT SOUTH HAVEN, MICH.

WE present as an illustration on page 14 in this issue a modern summer residence which has been erected for A. M. Worthington, Esq., at South Haven, Mich. The design is admirable, containing many excellent features, including pleasing elevations and well-arranged plans. The building being erected for summer use, only part of the cellar is excavated, containing ample space for laundry and refrigerator. The building is erected upon stone piers, and the space between ground and floor beams is filled in with imitation stone work. The first story and balustrade at piazza are clapboarded on the exterior and are painted dark green. The second story is covered with shingles and stained sienna. The roof is shingled and stained a dark soft brown color. Dimensions: Front, 43 ft.; side, 26 ft.; not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 4 in.; second, 8 ft. 4 in.; third, 7 ft. 6 in. The hall, sitting-room, and bedroom are trimmed with antique oak, and the study and dining-room with cherry. The hall contains an ornamental staircase turned out of oak, and is erected in conjunction with the partition between hall and sitting-room, which has an archway with columns rising to ceiling. The sitting-room has a swell bay window at front and paneled seat. The study contains an open fireplace trimmed with brick facings, and hearth and mantel of excellent design. The dining-room has a similar fireplace. The kitchen and its apartments are wainscoted and fitted up complete. The second floor contains six bedrooms, large closets, and bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed nickel-plated plumbing. The third floor contains six bedrooms, with direct communication with hall, all well lighted and ventilated. The building is lighted throughout with electricity. Cost, $3,100 complete. Mr. A. M. Worthington, architect, South Haven, Mich.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL RESIDENCE AT OVERBROOK FARMS, PA.

THE engraving presented on page 9 in this issue illustrates a residence erected recently for Messrs. Wendell & Smith, at Overbrook Farms, Pa. The building is treated in the Colonial style of architecture. Among its excellent features are a gambrel roof, hanging bay windows, dormer windows, and a broad, spacious piazza. The underpinning, balustrade to piazza, and part of first story are built of rock-faced stone of a bluish gray color. The remainder of the building is constructed of brick and pebble dashed and tinted a cream yellow. The roof is covered with shingles and stained a dark red. Dimensions: Front, 32 ft.; side, 57 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in; second, 9 ft.; third, 8 ft. The interior arrangement is most complete. The large vestibule, with bay window, and the reception hall are trimmed with oak. The latter has a paneled ceiling, and contains an open fireplace built of brick, with hearth and facings of tiles and mantel of oak, and an ornamental staircase with carved newels turned out of oak. The parlor is treated with white enamel finish, and contains an open fireplace trimmed with tiles and mantel of special design. The dining-room is trimmed with oak, and contains a large bay window with wide sill for flowers, and china closet in corner with leaded glass doors. The pantry and kitchen are tiled to a height of four feet with white enamel tile, and contains a large dresser and all the best modern improvements. All the trim is painted with white enamel. The laundry in cellar is provided with three soapstone tubs with hot and cold water supply. The second floor is trimmed with white pine, and it contains five large bedrooms, closets and bathroom. The bathroom is wainscoted with white enamel tile, and is provided with porcelain fixtures and exposed nickel-plated plumbing. The third floor contains a large billiard-room, one guestroom, servant-room, and trunk-room. A cemented cellar contains furnace and other necessary rooms. Messrs. Wendell & Smith, builders, Overbrook Farms, Pa.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN DWELLING AT SPRINGFIELD, MASS.

THE engravings shown on page 10 illustrate a modern dwelling which has been erected for Mr. Edward A. Bowser, at Springfield, Mass. The building has many excellent features, including bay windows, a broad piazza, porch, balcony, etc. The underpinning is built of red brick laid up in red mortar. The superstructure is covered with sheathing, paper, and shingles, left to weather finish, while the trimmings are painted white. The roof is covered with shingles and stained a dull moss green. Dimensions: Front, 26 ft. 6 in.; side, 37 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The hall is treated in a handsome manner with oak. It has a paneled wainscoting, a pleasant nook with paneled seat, and an open fireplace with tiled hearth and facings, and a mantel paneled to ceiling. The staircase is turned out of oak and in a handsome manner with newel posts and balusters. A bay window is thrown out at second landing and is glazed with leaded glass. The parlor is treated in white enamel, and it has a fireplace with white enamel tile facings and hearth, and Colonial mantel. The dining-room is trimmed with oak, and is furnished with paneled wainscoting and ceiling beams; a nook is provided with buffet built in. The kitchen and its dependencies are trimmed and wainscoted with hard pine finished natural, and is provided with all the best modern fixtures complete. The second floor is trimmed with cypress, and contains four bedrooms and bathroom, the latter wainscoted and fitted up with porcelain fixtures and exposed plumbing. The third floor contains three bedrooms and ample storage. A cemented cellar contains laundry and furnace complete. Cost, $3,700 complete. J. D. & W. H. McKnight, architects, 137½ State Street, Springfield, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN SUMMER HOME, AT CRESCENT BLUFF, PINE ORCHARD, CONN.

WE present herewith on page 11 in this issue a modern summer house which has been recently erected for Henry C. Rowe, Esq., at Crescent Bluff, near Pine Orchard, Conn., on Long Island Sound. These engravings illustrate one of the most picturesque and attractive residences of its class in the vicinity of New Haven, and it is in keeping with its site. Moss-covered field stone laid up at random forms the underpinnings and railing at piazza, and constitutes one of the most pleasing features. The remainder of the building is built of wood, with the exterior framework covered with sheathing and sheathing paper, and then covered with shingles, which are stained a dark red-brown color with dark green bronze trimmings, making a most excellent combination. The roof lines are well broken with dormers and gables, and the roof is covered with shingles stained a moss green color. The chimneys are of moss-covered field stones, carefully selected and laid up roughly. Dimensions: Front, 34 ft.; side, 48 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The reception-hall, or living-room, is a handsome apartment, and is spacious and attractive. It contains a large open fireplace constructed of field stone, and a staircase of handsome design turned out of cypress and separated from the living-room proper by a spindle transom forming an arch. The ceiling is paneled. The dining-room is finished in the same manner as the living-room, and contains another large stone fireplace, and also a china closet built in and a large butler's pantry. The ceiling is paneled. The floors are laid in two-inch flooring and planed smooth. The side walls on both floors are sheathed and wainscoted, and the ceiling paneled, all of clear cypress and North Carolina pine. The library is conveniently located and is fitted up completely. The kitchen, laundry, and other rooms are fitted up in a most excellent and replete manner. The rear hall, telephone closet, bathrooms, and bicycle-rooms are all excellent features. The second floor contains six bedrooms, twelve closets, and bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed nickel-plated plumbing. The third floor contains two bedrooms and ample storage. Messrs. Brown & Von Beren, architects, 425 Exchange Building, New Haven, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

Superficial Art.

WHETHER it is better to "decorate construction" or to "construct decoration" is a question to be answered by those who have been reared in the earlier decades of this century. We have somewhat advanced beyond this conception of architecture. We recognize no decoration that is worthy of the name that does not arise out of construction as the basis, so that either of the above ways of putting the case is misleading as making decoration something separated and distinguishable from construction; and yet we suppose there are a large number of architects who are ready to accept the above dictum, and to apply their decoration to their buildings. It is an easy and expeditious mode of making architecture; one that falls in wonderfully well with our facilities of execution and manufactured materials of decoration, and also one which the public or the average man and woman can appreciate, who like to pay for something tangible, for so much of "art decoration" or so little of it as they think fit. They look upon it as something that can be applied to any building in quantity great or small, and therefore it has a money price. This view of architecture lends itself to commercial considerations and to the superficial. Buildings can be covered with plain or costly garments; they can be decorated more or less according to the amount of money to be expended, quite irrespective of their design or construction. No doubt such an interpretation of architecture has been in vogue ever since the Revival, and architects still cling to it as being the popular one, and it has also been extended to the various allied arts. Carving, metalwork, stained-glass, ceramic decoration, furniture, have all suffered more or less by this idea of applying ornament to objects of use, for they have all been taken to mean something superficial that can be applied to buildings and furniture. Arising out of this notion is another quite as objectionable: that the decoration can be in any style. The makers of fashionable furniture, plastic decoration, and metalwork manufacture the same articles in various styles. They rejoice in the appellation of "Renaissance," "Louis Seize," "The Empire," "Gothic," "Stuart," "Japanese," etc.—a practice that has done more to degrade so-called art than anything else; but there is no differentiation for differing uses. For how can the same ornament be used for a shop that is used in a town-hall, or applied to a door-hinge that is used on a coal-scuttle? We can understand the principles of ornamentation that underlie the different styles being applied, but not the ornament itself.

Our modern architecture—especially of the commercial kind—is a realization of this confused thought; it fairly interprets the idea that "art" and any given style can be applied to the most commonplace building, just as we can decorate a cake in any style with sugar and confectionery. Apply a certain form of feature, or ornament, to a building, and it is thenceforth made Renaissance, or Gothic, or "Queen Anne." The application can all be arranged after the plan has been prepared or in the elevation. It does not matter one iota whether the plan has been devised to give prominence to certain features, or the parts be dictated by any motive; it is sufficient to put a break here, a bay window or turret there, and the design is thenceforth Gothic.

The art exhibitions that were opened recently represent the new life and impulse that have been given to those departments of art, one relating chiefly to domestic and home life, and the other to church work. The Arts and Crafts Exhibition illustrates practical examples of design and workmanship;—how consistency and honesty of purpose can be made the basis of all art effort. In it we see those valuable principles initiated and promulgated by such men as William Morris in various departments of industrial labor, who was one of the first to remove the trammels of labor, and make it subserve the highest ends of the individual workman. The Church Congress exhibition of Ecclesiastical Art also was interesting as illustrating an improved type of metalwork, stained glass, and embroidery; and the Clergy and Artists' Association shows a remarkable advance in church decoration and metalwork, under the leadership of our best architects and craftsmen—all in their way directed to overcome the baneful influence of custom, and the superficial treatment of art as applied to our buildings.

The superficiality of which we speak is noticed largely in our commercial buildings, our shops, and dwelling-houses. It is manifested in three particulars: (1) Defective plan, (2) thinness of detail, and (3) poor fittings. In each of these the architect appears to do his work hurriedly. If there are two or more possible ways of doing a thing, the easiest and most direct is taken. The "short-cut" is the watchword of the commercial architect. The position of a doorway is a small matter to thousands of people; but it may make all the difference in the world to the man who occupies a set of offices, or a house, if he has to walk a few feet further than necessary in his passage from one office or room to another every day; or his comfort and freedom from drafty currents of cold air may be secured if a door is placed a few feet or inches further one way or another. But the superficial and hurried planner of buildings takes no trouble about such matters; he places his doorways as they are planned in thousands of houses—they are placed in line—it is easier to draw the plan so—regardless of the comfort of the tenants or occupants. Several hundreds of houses have to be built, and if the plans can be multiplied from the same design, the better it is for the builder. Windows are planned on the same principle; they are placed where they look best, and one over the other; light and ventilation are questions that do not trouble the designer, so the evil of having a window in the wrong place at one corner of the room is repeated. So with the size and proportion of rooms—matters which very few people consider—that which divides the easiest is adopted, and hundreds of people have to endure a small, badly shaped room in which they can hardly get round the table comfortably, or derive any warmth from the fire in winter. Take, again, the staircase. How many houses have convenient stairs or entrances? It is the superficial designer that is to blame, for he likes a straight flight starting from the entrance, and a straight flight down the cellar, and over to every story. Yet every one knows now this is the worst arrangement, the most dangerous, and the most uncomfortable. But it is simplest and cheapest; the labor is less in this form, and the cost is therefore less. Then there is what may be called the "cooked" staircase—two or more flights squeezed into a space that is inadequate—very tiring to ascend, and dangerous to come down; it is a kind of "dog-legged" arrangement, only with the second flight at right angles to the first, which latter consists of only a few steps; it has a dangerously high rise and small tread, and often has winders. This plan is often seen in small villas; it involves the necessity of hoisting up all the large and heavier pieces of furniture through the windows, and taking out the sashes for wardrobes and pianos. To turn the corners of such a staircase with a large sideboard or bookcase would be impossible without injury to the walls or furniture. A few more inches in width, and a foot or two more in length of "going," as it is technically termed, would have made an easy and effective arrangement. Questions about the position of furniture, sideboards, bookcases, wardrobes, pianofortes, and even chairs, of fireplaces, of wall space for hanging pictures, etc., seldom enter the head of the speculative architect.

The details of the buildings of this class are meager and thin. Cornices, the moldings round doors and windows, paneling, are all characterized by this quality of thinness; there is a want of solidity in them. The designer has only thought of putting all on his surfaces in the least expensive form; "bracketing out" cornices entails labor; moldings worked out of the solid are out of the question when moldings can be so readily "planted" on. The old woodwork was solid; the moldings formed part of the substance of the wood. The tie-beams and rafters of old church roofs have often moldings worked along the edges, but we do not work so now; the tie-beam is simply chamfered or beaded. We represent a beam formed of grooved and tongued boards fixed to brackets, with machine run moldings nailed along the edge. Our framed partitions and paneled woodwork are turned out by the machine. We cannot mistake them by the side of an old piece of paneling or wainscoting; the one is an example of the superficial mode of working, the other is hand-wrought and solid, the moldings forming part of the framing. Machine-made moldings are now "planted" on, a stock capping put along the top. We know the flimsy character of ordinary framed woodwork, especially when machine-made moldings are used. It is a relief to the eye to see a plain bold quarter-round and fillet round our panels or architraves, or a bold ovolo in a cornice, instead of the everlasting quirked molding of the mills.

Applied ornament is largely used in plaster work. It can be applied easily to large surfaces, to the enrichment of cornices, friezes, panels, and the like, and there is a fatal tendency to put it on thick. The plasterer can defy ordinary structural lines and rules, and the nature of his material allows him to exceed the limits which other tradesmen have to keep. The decorative fabrics in the market encourage the superficialist, because he can apply them lavishly and at comparatively little cost. A dado can be covered with elaborate relief ornament that would have cost in carved wood or plaster a prohibitive sum; a ceiling can be covered with an intricate pattern in "Anaglypta," or in any of the new fibrous plasters, that would have defied our best plasterers and modelers early in the present century; columns and square piers are lined with lincrusta or some embossed material, leaving hardly a square yard of plain surface anywhere. We are speaking now of some of our recently built restaurant interiors, or theater lounges and vestibules. It is all applied ornament, good or bad in design, but so profuse and unintermittent that there is no relief for the eye. Perhaps we see an intricate-patterned ceiling bagging down here and there, as if in willful satire, showing at once what the decoration is; or we see a flat abacus sprawling upon the rich pattern of the ceiling without the slightest reference to the ornament which has been cut round it. These are some of the vagaries of the lavish use of applied decoration. In the iron and metal finishings of our houses, articles like stoves, locks, and door furniture, the superficial is also rampant. Manufacturers vie with one another in producing these articles with the most prolific display of cast ornament. It is a matter only of first expense in the pattern. Can we honestly say these florid cast-iron grates are as substantial as they should be? And is not this plethora of ornament tiresome and obtrusive in our fireplaces, where we look for quietness and rest? So at least many think, and we can refer our sympathizing readers to the present Arts and Crafts Exhibition now open in Regent Street, where that useful and important feature of our homes may be seen treated in not only a sensible method, but in a manner at once decorative and restful. We do not say that these models are all that can be desired; in one or two examples of fireplace treatment these merits have been a little exaggerated, and the desire for quaintness has exceeded the motives for honesty. But we take them as a healthful indication of better things—an attempt to bring our homely arts to the tribunal of common sense.—Building News.

Sculpture in Terra-Cotta.

IT is now difficult to say what material was first used for representative purposes in art. Many people in London and other seaports, from seeing the numerous importations, are confident that ancient art began with attempts to make cocoanuts or similar fruit assume the appearance of a human head. There are modern artists who believe that early sculpture began with operations on gourds. Primitive artists would be likely to employ objects which resembled whatever they sought to represent, for their efforts would then be restricted to the completion of forms in which nature appeared to cooperate with them. A great deal would depend on what they found around them. Cocoanuts are not produced everywhere, and it must be said that the prehistoric collections which contain European or Asiatic work do not suggest that art began with adaptations of natural objects. The bone of a reindeer might serve as a flat and sufficiently yielding substance to allow an embryo sculptor to scrape a few lines on it, to indicate an appearance of the animal before it was utilized for food, but, so far as we know, a bone was not considered as sufficient to recall by itself either the deer or a different part of the deer. Difficulty is, as Burke says, an excellent instructress. For all we know to the contrary, the ancestors of the modern adapters of cocoanuts may have been doing similar work at the period when men were elsewhere attempting to represent living beings by means of lines but the obstacles surmounted in one zone imparted increased power, of which modern art is a development, while elsewhere art remains as it began.

Nowadays it is said there must be an absence of utility from all works of art which are worthy of the name, but in early days that characteristic was not demanded. The first man who had a claim to recognition as a sculptor was doubtless a potter, and we may suppose with no less reason the first potter was a baker. Any one who could produce baked bread would find it was easy to make a similar form in clay. At first the baked flour and the baked clay were likely to be rather amorphous in appearance, but grace came as the years rolled on.

The Greeks believed their first worker in terra-cotta was Dibutades, and we should respect their endeavor to preserve the name of an early artist. It is, however, certain that ages before he appeared the art was known and practiced in various regions of the East. Greek pride rebelled at the notion of indebtedness for inventions to tribes that were scorned as barbarians, and accordingly they acted as if the sea had been a barrier of bronze instead of a means of intercourse with other lands. We can now smile at the simplicity of so able a race, for we know that baked clay is so old a product that there is no possibility of ascertaining when or where it originated. The Romans accepted Greek traditions as if they were booty, and accordingly we find Pliny ascribing the glory of the discovery of terra-cotta to Dibutades, with as much certainty as if the potter had been employed by him, and had related the whole of the circumstances of his first attempts to the naturalist. They were undoubtedly interesting, for, according to the legend, Dibutades began with forming a kind of relief within the outlines of the countenance of a young man which his daughter had traced on a wall. To impart more vitality to the appearance the potter mixed some red clay with the mass. That in ancient sculpture red was employed to an extent which now appears extraordinary cannot be questioned, but whether the practice began with Dibutades must be always doubtful. If we take language as a test, the Greeks seem to have shown their reverence for the ancient clay-workers by regarding them as representing the *genus* of sculptors, while various compound words were introduced to signify the species of artists who produced bas-reliefs, war figures, statues in marble, etc.

Another proof of the conservatism of the Greeks is suggested by the value possessed by terra-cotta vases. In the course of time more costly materials were employed, but there were associations with the potters' work which could not be overcome. The Romans must

have prized vases of precious metals, or of onyx and other rare substances, but they assumed a taste for what was ancient. If we believe Pliny, the terra-cotta vases sometimes brought the highest prices in Rome. There was a limit to the dimensions of a murrhine vase or one of gold, but the potters were able to gratify the Roman desire for the colossal. It is related that Vitellius paid a million sesterces, or about £7,000, for a dish, a price that no example of "old blue" has reached in our time. Occasionally the skill which made large works feasible was advantageous, especially for architectural ornament. The exterior of the Temple of Jupiter Capitolinus was adorned with quadrigas or chariots, which could not be produced in any other material except terra-cotta. When it is said that a college for *figulini* was founded by Numa, it is only reasonable to suppose that among the members were artists who were prepared to undertake architectural sculpture on a heroic scale. In fact, it is now impossible for us to realize all the importance of the terra-cotta works of the Greeks or the Greco-Roman artists. At the fall of the Empire, when the treasures of Rome, including Greek works, were doomed to be dispersed, material was often considered as of more importance than workmanship. Marble figures were preserved, while those of clay were broken. Most of the examples found in museums were derived from subterranean chambers or other receptacles which were long neglected. The loss is to be lamented.

According to the tradition recorded by Pliny, it was customary from the time of Lysistratus to prepare full-sized models in clay which would bear to be baked of figures which were to be executed in marble or bronze. Sometimes the reproduction was never undertaken, and the model was used instead to adorn a temple or public place. From the eulogies of Pliny upon the clay models of Pasiteles, who lived in the Augustan era, it is evident that the practice was of long duration, and we may assume the model sometimes possessed qualities which were not always successfully transferred to the figure in bronze or marble.

Another advantage which terra-cotta possessed was its capability to receive color. The Tanagra figurines were a revelation to those who imagined that the coloring of the Greeks resembled modern experiments, and was incompatible with the delicacy of the ancient contours. The numerous memorials which were discovered in the cemetery proved that the color was also subjected to rules, and without it the smallest example would be deprived of much charm. We may, therefore, be confident the larger examples of terra-cotta would, when colored, be treated with at least as much success as prevailed among the funeral furnishers of Tanagra.

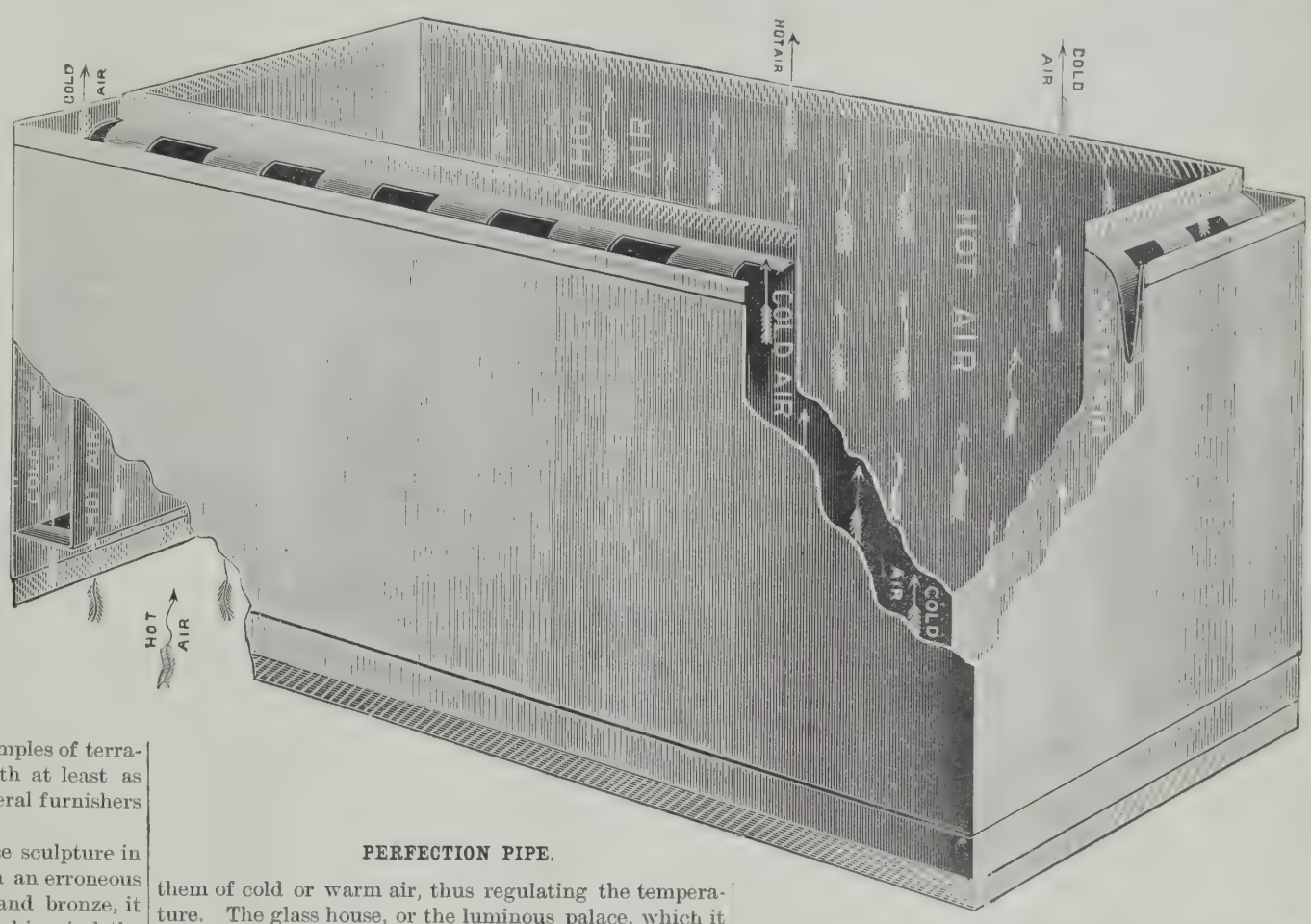
Many of our modern attempts to produce sculpture in terra-cotta appear to us to be derived from an erroneous idea of Greek art. Working in marble and bronze, it was right for the sculptor to keep before his mind the rigidity of the materials; and, besides, with many of the subjects selected (judging by the examples which have survived), austerity of appearance was not out of place. But a Greek sculptor must have appreciated the obedience with which clay yielded to his nimble fingers, and his treatment would correspond with the facilities offered by the material. The severity of the Greek artists is not in keeping with our times or with the subjects which are generally preferred for sculpturesque treatment. It may be we have become more frivolous, but, whatever the reason, it is evident that in sculpture as in painting we have lost the power to enjoy what was one time known as high art.—The Architect and Contract Reporter.

Glass Pavement.

EARLY in October, 1898, a paving company of Lyons, France, began laying on the Rue de la République, in that city, a piece of pavement of ceramo-crystal, ceramic stone, or devitrified glass. During the months of November and December, and some time in 1899, this pavement has been driven over during all hours of the day and night. It has stood as hard usage as any pavement could be subjected to during that time, and is still said to be in an admirable state of preservation. The glass or ceramic stone pavement is laid in the form of blocks, eight inches square, each block containing sixteen parts in the form of checkers. These blocks are so closely fitted together that water cannot pass between them, and the whole pavement looks like one large checker-board. The roadbed slopes gently to the walk on each side. Some of the edges of the checkers have been broken off by wear. United States Consul Covert counted some twenty of them that had been slightly chipped on the edges. It is contended that this does not argue against the value of the material as a pavement, and that any kind of stone would have suffered just as much or more in the same time.

Mr. Covert visited the Ceramo-Crystal Manufacturing Company's works at the suburban village of Demi-Lune, about six miles from Lyons. The factories cover nearly 8,000 square yards of ground. Work is now stopped in them while additions are being made to the buildings in the shape of second stories. In the yards are many tons of broken bottles, which the superintendent told him was their "raw material." On the four sides of a large brick smokestack are specimens of ceramo-crystal for buildings and interior decoration, some of the pieces as smooth as highly polished marble, others being rough, like cut stone, and still others having a surface like common brick. The advantages attributed to this ceramo-crystal by the manufacturers are: As a pavement, it has a greater resistance than stone; it is a poor conductor of heat, and ice will not form upon it readily; dirt will not accumulate upon it as easily as upon stone, and it will not retain microbes; it is more durable than stone, and just as cheap. The Central Architectural Society of France made a report recently on this ceramic stone.

An elaborate article in the "Revue des Deux Mondes" treated the question under the heading of "A Glass House," the writer asserting that a large house constructed entirely of glass would be an attractive feature of the coming World's Exposition of 1900. He said that glass could be used for tubes, pipes, vats, tiles, smokestacks for factories, and for buildings. Double glass walls in a house would admit of the circulation between them of cold or warm air, thus regulating the temperature. The glass house, or the luminous palace, which it has been decided to build on the grounds of the 1900 Exposition is now being constructed.—Building News.



PERFECTION PIPE.

PERFECTION PIPE.

HERETOFORE heater-flues for conveying the air from a furnace to the upper stories of a house have been made of single pipe, covered with iron lath and asbestos paper. The pipes are placed between wood studdings forming the partitions of the house, and are then covered up with lath and plaster. Unscrupulous contractors often take advantage of this construction.

To overcome this objection, the Perfection Furnace-Pipe Company, of 590 Broadway, Toledo, Ohio, have devised an arrangement comprising a double-wall flue with a cold-air space between the inner and outer walls, as the accompanying illustration shows. The pipe is perfectly safe under all conditions, no matter how close it may be placed to the woodwork.

How to Make Putty.

ORDINARILY, putty is a mixture of whiting (sulphate of lime) and linseed oil, or of white lead stiffened with whiting. But there are other sorts of putty made quite differently from these formulas. There is a putty for stopping nail holes in wood, made by mixing fine sawdust into a thick paste with dissolved glue. This is pounded into the hole, and when dry is smoothed off with sandpaper. A correspondent of "Stoves and Hardware" says he has used this recipe for thirty years in repairing bellows—a very severe test. Frequent renewals of leather attachments to old bellows frames causes the wood to become so punctured with nail holes that there is no longer unbroken spaces for the new nails. The sawdust putty makes the wood solid.

A good iron putty for cementing steam joints and joints of stoves or for stopping holes in castings is made by mixing, dry, two parts of good iron oxide paint, one part litharge, three parts fine iron borings (sifted), or for close joints use iron filings; add boiled linseed oil, and mix stiff.

An oil putty or cement for wood is easily made. Take one part slaked lime (pulverized) and two parts rye flour; mix with oil varnish. Color to any desired shade. Another formula: Fifty parts red lead, 100 parts pipe-clay, 125 parts white lead; mix with boiled oil.

A very durable and elastic putty that is useful for many purposes is made as follows: Boil 4 lbs. umber in 7 lbs. linseed oil for two hours; stir in 2 oz. common beeswax. Take from the fire, add 5½ lbs. chalk and 11 lbs. white lead (dry) and mix completely. This is the rubar or French putty, and it will adhere well to unpainted wood.

Equal parts of red and white lead made into a stiff paste with boiled linseed oil makes a good hard putty.

Coachmakers' putty may be made of dry white lead, three parts; whiting, one part; add varnish and japan, equal parts. Beat it well, and do not make too stiff. A little turpentine added causes it to sandpaper easier, while additional varnish will toughen it and make rubbing down more difficult.

A good soft putty is made of whiting, nine parts; white lead, one part; mixed with boiled linseed oil. A few drops of sweet or other non-drying oil will prevent the putty from becoming too hard and scaling off, as common putty does.

The best putty for skylights and other exposed places is made of whiting and boiled oil. Mix no more than enough, as it soon becomes hard.

White lead, in oil, stiffened with whiting, makes the best putty for painters' use on inside work.

A good hard putty is composed of dry red lead, boiled oil and turpentine varnish. Make as wanted, as it hardens soon after mixing.

A cheap putty, useful for certain kinds of work, is made as follows: Rye flour, ten parts; slaked lime, five parts; oil varnish, five parts; color if desired.

To make good flour putty, take litharge, one part; plaster of Paris, two parts; glue, one part; water, eight parts; cement (such as Portland, etc.), four parts; sawdust, two parts. Mix well.

Hard putty is difficult to remove, and various means are employed to do so. Caustic alkali or carbonate of potash, with an equal part of fresh-powdered quicklime mixed to a paste with water and spread on the hard putty, will soften it. Add a little soft soap to prevent the paste from drying too rapidly. Two or more applications may be necessary.

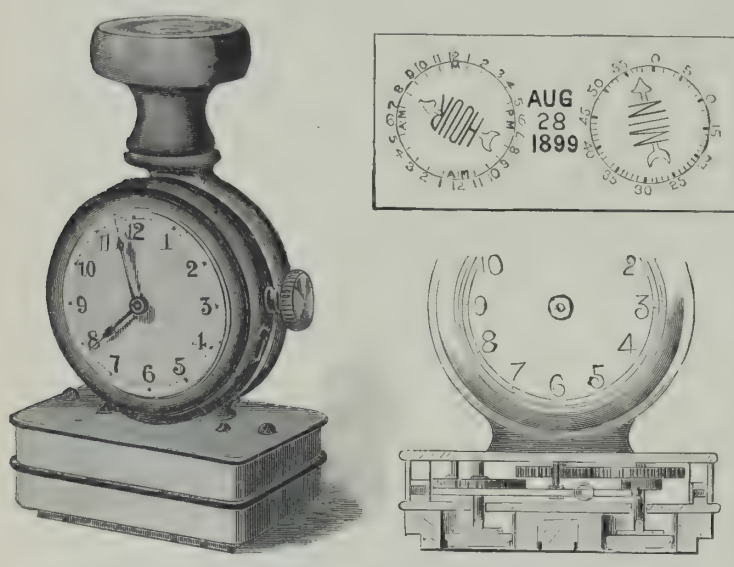
A hot iron will also soften putty, but cannot safely be used around glass.—A. Ashmun Kelly, in the National Builder.

A FRENCH architect recently invented a novel mode of advertising the business of a friend, who is a restaurant keeper, having an establishment a little way from the main business street of the city. The architect, remembering that people in city streets generally walk with their eyes directed downward, proposed placing a glass slab in the sidewalk, and having beneath it an illuminated advertisement calling attention to the eating house around the corner, while a graphophone near by announced to the passers-by the bill-of-fare of the day. The scheme was approved by the Department of Public Works, but met with the disapproval of other officials, so M. Chevallier, the inventor, has given it to his brother architects for what it is worth.

A TIME-STAMP FOR MERCANTILE USE.

In many lines of business it is a matter of great importance to record the exact time of acts, operations or transactions, and to note upon papers and articles of various kinds the time of receipt or departure. A simple stamp by means of which such times can be recorded has been placed upon the market by Samuel H. Hoggson & Company, of 27 Thames Street, New York city, and possesses certain features of construction not uninteresting from a mechanical point of view.

The time-stamp comprises essentially a watch held in a body supported above a printing base. The printing



HOGGSON POCKET TIME-STAMP.

base is provided with two recessed printing dials. Minute and hour shafts respectively extend within the recesses of the minute and hour dials and have printing hands normally resting above the dials. By means of gearing the minute and hour shafts are so connected with the watch mechanism that the minute and hour hands of the shafts are made to rotate in unison with the corresponding hands of the watch.

The body of the stamp, in which the watch is carried, is yieldingly supported above the printing base and is movable with the time-printing hands. The parts are so assembled that when the base carrying the dials is pressed against a piece of paper, the printing hands in the dial recesses can be forced into contact with the paper by depressing the body of the stamp. The time thus stamped upon the paper will coincide with the time indicated by the watch.

The hour dial, it will be observed, has two series of twelve graduations each. Owing to the arrangement of these graduations, it is unnecessary to provide any changing device to denote the "A. M.," "P. M.," and "M." divisions of the twenty-four hours, for it is immediately apparent that the upper half of the dial denotes day and the lower half night.

In operation the stamp is pressed upon an inked pad, then upon the article to be marked, a very slight pressure sufficing to insure a legible impression, giving year, month, day and minute, together with any wording desired around the dials. The stamp is only 4½ inches high, and weighs but 10 ounces.

"Ferro-Plasteroide."

"FERRO-PLASTEROIDE" is the only product which will prevent rust on iron, steel, cast iron, water or gas pipe under or above ground. Used in ship building, either under or above water, it will be found a great protector. When used on carriages, trucks, springs, and iron attachments of all kinds, it will prevent rust and the peeling off of paint.

When used on iron structures before they are covered with brick, stone or cement, or on skeleton iron work of all kinds in cellars or sub-cellars, it prevents rust and oxidizing, and also the penetration of dampness.

Ferro-plasteroide being a perfect insulator of electricity, can be used for protecting wiring for electric lights, etc.

Ferro-plasteroide is prepared in black, red, green, gray and blue, the principal colors used for priming work for ship building and buildings of all kinds.

It is used on zinc or corrugated iron, for cornices, bay windows, or ornamental fronts of houses for priming, and prevents the paint from peeling.

The red color constitutes a good paint for brick in basement or light court, and is guaranteed to prevent dampness from penetrating, and the appearance of the white stains which are found often in the front of buildings after the winter or frost season.

A second variety of Ferro-plasteroide is especially adapted for machinery, sporting goods, agricultural implements, preventing rust and oxidizing, and for yachts and hardwood finish, as it prevents warping. It is used as a filler for hardwood, both above and below water, preventing the penetration of dampness; and is also used on iron, steel, or brass attachments.

It is used for preserving the brightness of signs, brass and steel work, railings, swinging doors in barrooms and hotels, and for iron and wooden tanks in factories and apartment houses, preventing moisture or rust on iron, without affecting the water; also for covering iron molds, preventing warping in woodwork, and also worms.

It can be used before painting cottages at the seashore, as it prevents paint from cracking and blistering in warm as well as in cold weather. In a brewery, it can be used as a filler on beer kegs and large tanks, as it prevents the absorption of the liquid by the wood, and gives positively no taste to the beer.

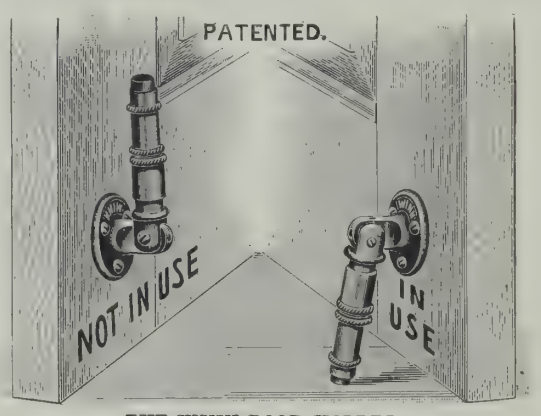
A third variety is made which is guaranteed to prevent water or saltpeter stains, as well as the suction on hot and porous walls. It is better than the shellac or cheap varnish now in use for priming on ceiling or wall, both for painting or distemper color. It will save two coats of paint for kitchen, hallway, bathroom and bedroom in cheap work, and enable the painter to finish the job the same day, priming with Ferro-plasteroide, no matter how damp the plaster or cement may be; it will be ready for paint after four hours, and will prevent the peeling off of paint.

The makers of Ferro-plasteroide are Z. C. Jaeck et Frères, 62–68 North Eleventh Street, Brooklyn, N. Y.

In a recent paper by Dr. Eddowes are to be found some new observations and a suggestion on Stonehenge. He believes that the thirty large upright stones, with their intervals, indicate that the circle was divided into sixty equal parts, that the grooved stone (which is the best selected, worked, and preserved stone in the whole ruin, but has never hitherto received the attention it deserved) was used for supporting a pole in a definite and permanent manner, and that the signs of wear at the mouth of the groove, together with the two worn horizontal hollows or waists, and the dimples on the convex back of the stone, indicate not only where, but how this pole was fixed. Such a pole would form the pointer of a sundial for daily observation, or—what was more important—an indicator of the time of year by the length of its shadow.

AN ADJUSTABLE DOOR-HOLDER.

The Winn Door-Holder, recently put upon the market, is a compact, serviceable article, having the element of



THE WINN DOOR-HOLDER.

neatness now recognized as essential in all articles of builders' hardware. The construction is novel, strong and durable, adapted alike to the heavy doors of halls, stores, etc., and to the lighter ones of residences, where the common method of placing some piece of furniture to hold the door in position is inconvenient, inefficient, and unsightly.

On its adjustable feature depends much of its usefulness, for by changing the length, any angle of brace can be secured to hold the door open to its farthest swing. The length can be adjusted so as to hold the door at any desired angle of opening—the holder resisting movement in either direction. When raised horizontally the device forms a bumper to strike against the baseboard. The engraving clearly illustrates the neatness and general appearance of the device. Brewer & Co., 79 Dearborn Street, Chicago, are the manufacturers.

Compressed Cork and Its Uses.

Cork, as every one knows, is one of the best non-conductors of heat or sound. That it has not been more widely used in building is due chiefly to the difficulty of obtaining it in an unadulterated form. A product called "cork tiling" has recently been placed upon the market which is made of what is known to the trade as "virgin cork," ground, compressed, and otherwise treated by a patented process, and which is free from the cement and glue usually employed to hold the particles together. We are informed that tiles made of this pure, compressed cork form an admirable flooring, which, besides being noiseless, water-proof, warm, and germ-proof, is capable of withstanding hard usage. By varying the degree of compression and modifying the manufacturing process slightly, sheets of cork different in color and density are obtained, which, when sawed and finished in the form of panels, can be used for wainscoting alone, or in connection with cork-tiled floors. Cork compressed into sheets and sawed to the size and thickness desired constitutes a very efficient pulley covering. It is said that a pulley covered or lagged with compressed cork will transmit from 50 to 60 per cent. more power with the same tension of belt than one having only a smooth iron surface. The manufacturers of this material are The Cork, Floor & Tile Co., 17 Milk Street, Boston, Mass.

French Success in Architecture.

The Record's Paris correspondent gives an interesting account of his interview with M. Benard, the successful designer in the Hearst fund University of California competition. The architect is confident that this colossal collection of buildings, when completed, will have no equal in the history of the world. The Versailles palace, the Louvre at Paris, St. Peter's at Rome, marvels of beauty, are still, M. Benard says, but "an accumulation of additions." The University of California buildings will have the advantage of being made from a single plan. What interests us, equally, as Americans, is that eleven successful candidates in this architectural competition were graduates of the Paris School of Fine Arts. It is worth while inquiring why no architect trained in this country alone has been successful in this competition.

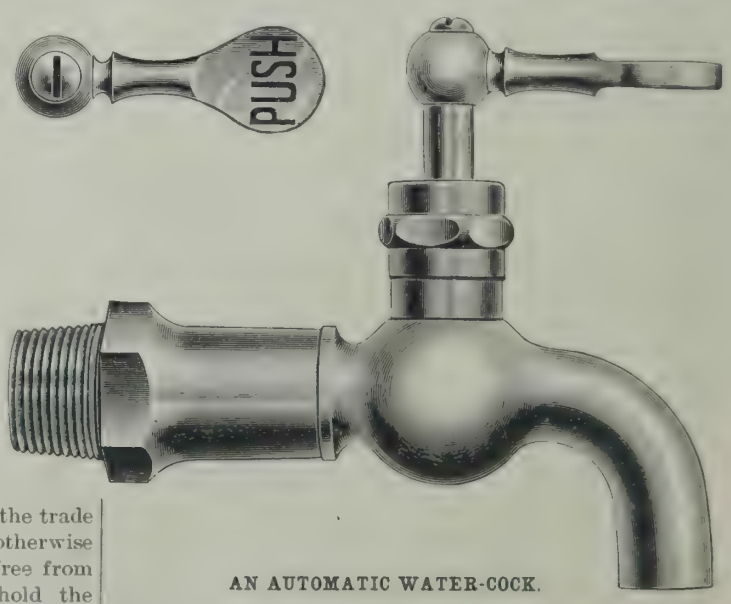
No one can doubt that Americans by pursuing new methods could beat the French in their own architectural field; but our students are said to grudge the time necessary for the successful designing of buildings of this character. They prefer to start at once on remunerative business. One success like M. Benard's needs a lifetime of devotion to study. Again, in Paris the notion of architecture is more generally prevalent than in our cities. The ancient Greeks, who excelled in sculpture, had their models constantly before their eyes in the contests of the gymnasium and the stadium. The modern Parisian student of architecture has the very best standards of architecture daily in view, from the wondrous Gothic of Notre Dame to that glory of the modern French Renaissance, the Madeleine. Under this inspiration the modern French architect has adorned the streets of many cities with houses on a large scale and richly decorated. He has then had to adapt the public buildings to these new surroundings.

A south side church in Chicago has a steeple on which electric arc lights are placed. The lamps, being 225 feet above the level of the street, are very conspicuous, and serve to effectually advertise the church.

A GOOD, SELF-CLOSING WATER-COCK.

A simple and trustworthy self-closing cock, for use either with or without water pressure, is shown in accompanying cut. It has Fuller ball and stem. The handle can be turned in cold weather without breaking the spindle if the cock be frozen.

When water is shut off from the pipes at the ground, the cock provides an air vent, allowing perfect drainage of water from the pipes. No springs are employed. The stuffing-box joints are securely closed, avoiding all leakage around the spindle by the use of a rubber sleeve with reduced bore at its upper end to fit the spindle closely. This end abuts firmly against a shoulder on the spindle, while the lower end, with a larger bore to allow free motion of the spindle, rests upon a shelf in the body of the cock. Any water pressure tends to close the stuffing-box more tightly. The supply valve is similar to that of a Fuller cock, and if it become worn, the play allowed the spindle by the stuffing-box sleeve is sufficient to take up the wear, permitting the



AN AUTOMATIC WATER-COCK.

valve to close firmly upon its seat. The slight spring action of the sleeve makes the valve self-closing without water pressure. To open the cock, a straight downward pressure on the handle is all that is required. Thos. Kelly & Bros., 201 Madison Street, Chicago, are the manufacturers.

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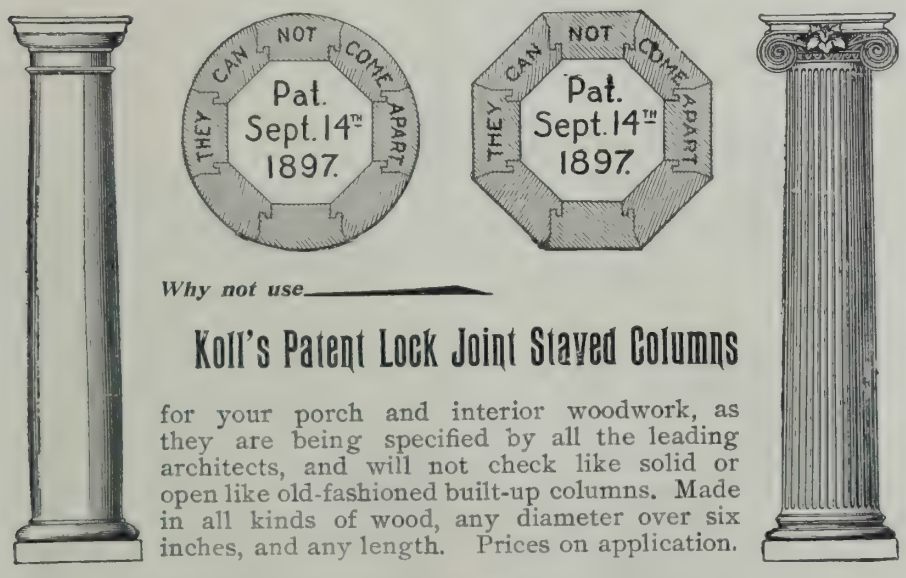

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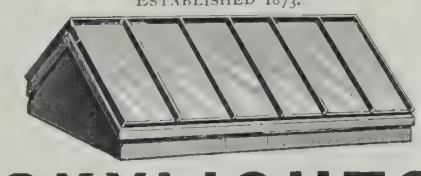

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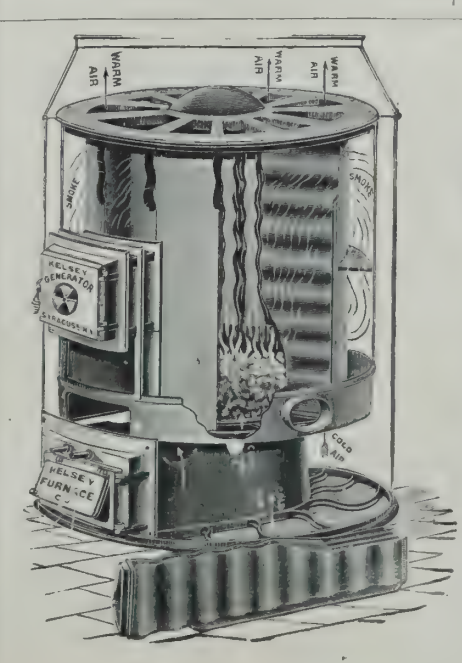

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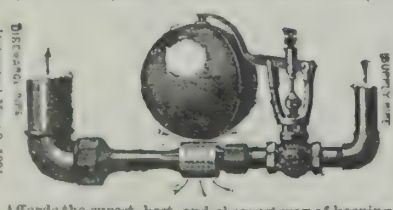

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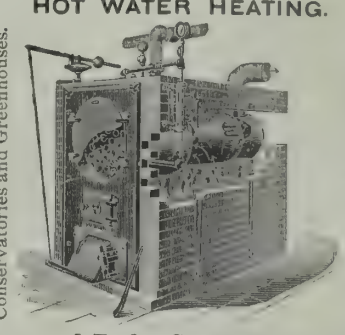

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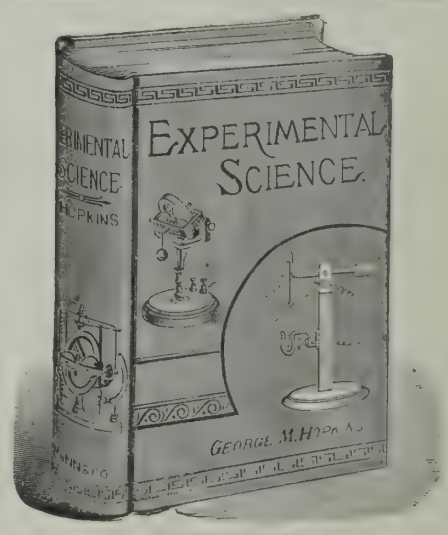

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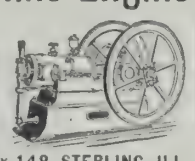

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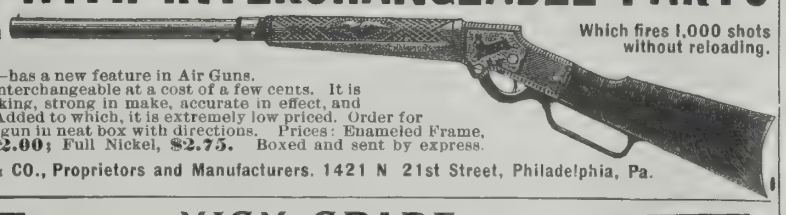

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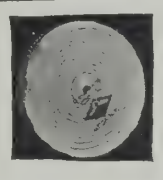

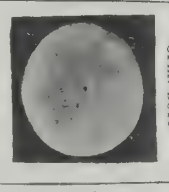

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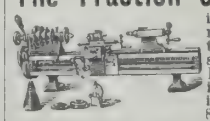

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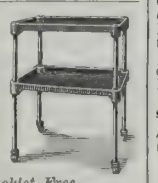

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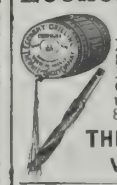

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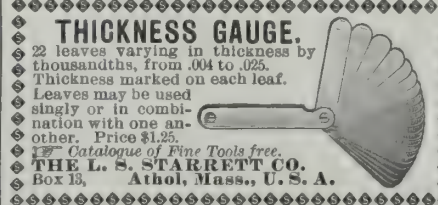

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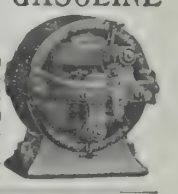

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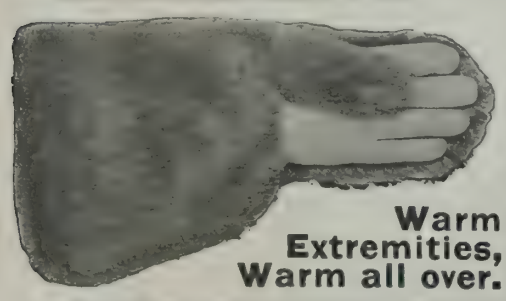

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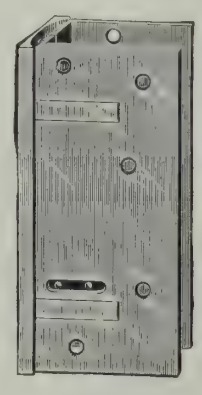

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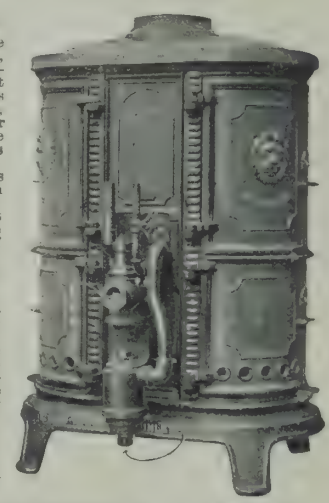

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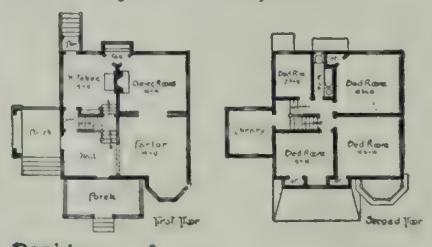

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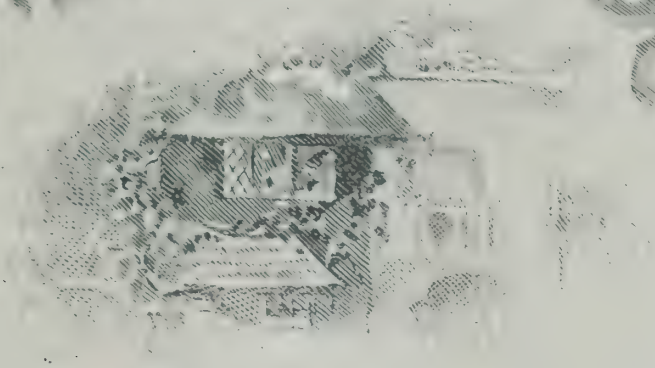

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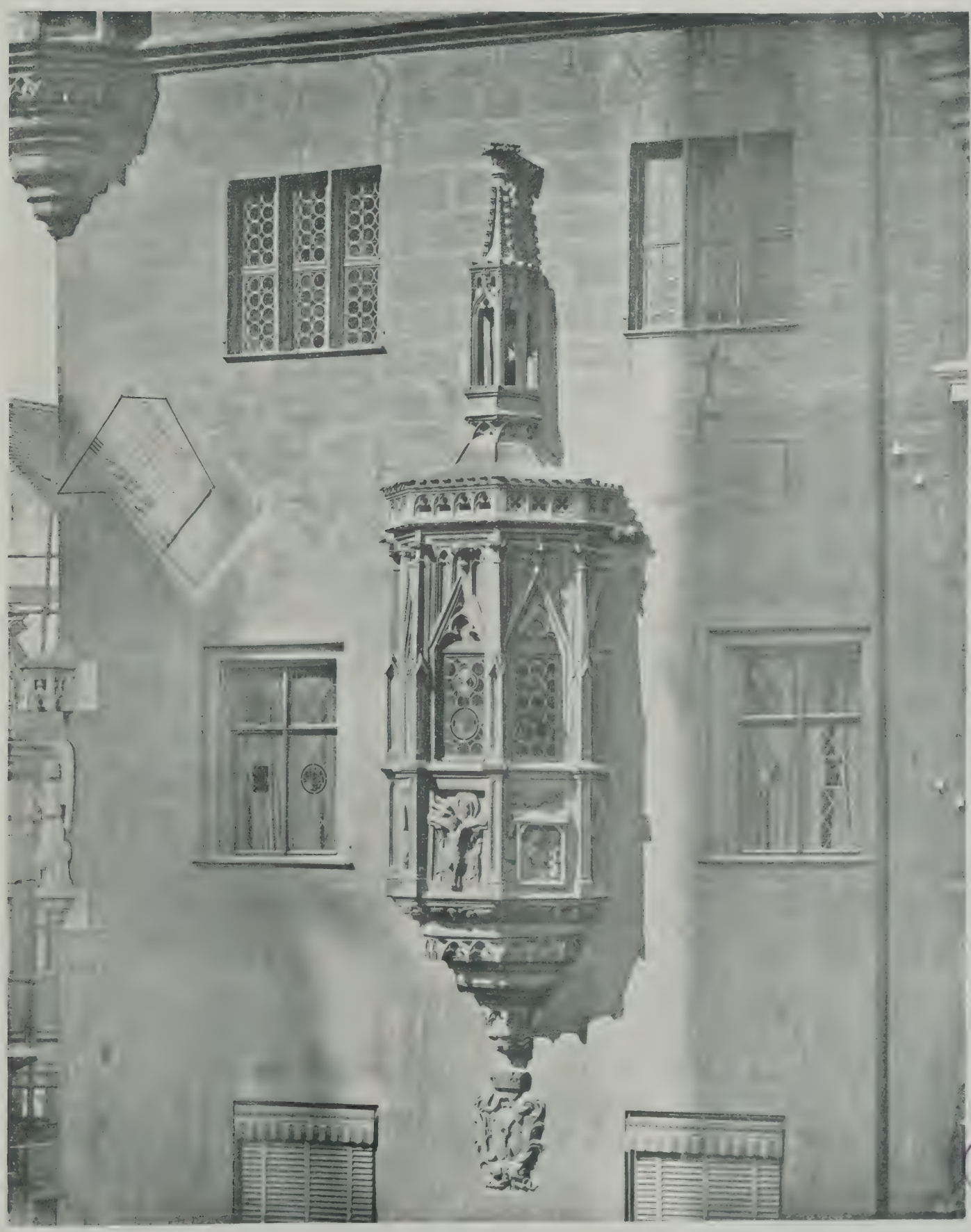

EASTERN ORIEL.—NASSAU HOUSE IN NUREMBERG.—See page 23.

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A LOST PRINCIPLE OF BEAUTY IN ARCHITECTURE.

WHY is it that whenever a handsome building is to be altered or pulled down, appeals from the cultured in every line of life are urged—even with passion—for its preservation? This question is asked by Julian Moore in the last number of the Fortnightly Review. The usual answer is that the older objects possess the "tone of age," and that all the new buildings and decoration will not look equally well until old and decrepit. Some, however, of the architectural erections on which we have done our very best within the last fifty years, being built of soft stone, look worn and aged already, but in spite of this they are as stiff as they ever were, and even as much so as our buildings only twelve months old. Against a theory which is apparently so open to criticism may it not be possible that the older architecture and decoration were formed on some lost principle of beauty that the researches of modern artists have yet failed to discover? There is much justification for so thinking; for one reason, because the three great temples of Athens were discovered some years back to have been built, not as one might imagine, from a superficial knowledge of their general form, on a series of straight lines, but on one of slight, almost infinitely slight curves. If the visitor to Athens place his hat or other small object at the corner of one of the steps of the Parthenon and try to sight it from the other end, he will find that it has sunk beneath the delicate curve in the middle. The designers saw that it would appear pleasanter and softer to the eye to have these curves than if each step was shaped to a line of ruler-like straightness from beginning to end. All parts of the great building have been shown to conform to a like principle, and some portions to be curved both vertically and horizontally. Similar divergencies exist in the old Gothic buildings of Venice. From investigations made amid many more architectural styles than his predecessors, Mr. Moore believes that all old buildings have been erected either in exact facsimile of beautiful freehand drawings, or in accordance with a principle of irregularity which was noticed. Good artists often impart to roofs, pediments, etc., when drawing them in freehand, such informalities, and it was found by experience that these could be satisfactorily added as convenient to stone reproductions of ruler-made designs as conventions. In fine art such a custom is most religiously sought and obeyed. No artist, for example, would draw a doorway or building within his picture with mechanical aids. By doing so this part of his work would lose what artists call "quality" or "beauty" in the drawing. To make their buildings look when built as beautiful as they might appear in beautiful freehand drawings—as beautiful as ours sometimes look in the freehand drawings of our best artists, but alas, only in such drawings—was, says Mr. Moore, the high ambition of our ancestors, and the one that they can be shown to have always kept in view, even from examples of their slighter architectural efforts. Mr. Moore has found it possible, by dint of measuring, to formulate a few of the inaccuracies imperceptible to an average fixed glance. All do not invariably occur together, and doubtless each architect had a slightly different manner of applying them. They were the seasoning of the salad, and would surely lose all charm if applied too rigidly or by a hand not tempered to their use.

The rising sides of a Greek pediment were usually humped very slightly. The architrave, or horizontal side, though apparently straight, was really made in the form of a wave line. The point of a roof was made either to rise from each gable to a point midway between them, and thus form a convex curve, or to sink and form a concave. The sides, too, were not made flat, but either bulged or sunk. Sometimes they both bulged or sunk after the form of moulding known as "ogee," but, of course, to a very much less extent. The eaves usually dipped in a curve from both gables to a point midway between them, or were bent in a series of small and irregularly formed curves. The slates or tiles were laid in wavy lines, or in one general curve; each line, in this case, being lowest midway between each gable. It was the custom, too, to reduce the sizes of the slates as the work progressed from bottom to top. The curves mentioned here are still used in thatching cottages, it being a theory with thatchers that such a roof will absorb less water than one formed on a system of straight lines. Whatever the object may be, the picturesqueness of many thatched cottages is quite undeniable. The vertical sides of a niche or doorway would bend into the opening. The openings for windows and doors were not made in the middle of each wall, if it could be avoided. It was apparently thought that to have the panels on each side of equal size was painfully stiff to the eye. The walls were never plumbed. This may be noticed in the nave of Westminster Abbey, where they all bend inward about the height of the keystones of the arches and outward above and below this point. This was not done sufficiently, however, to render them structurally unsound. An arch was usually a curve drawn by the eye and not by a pair of compasses. When, however, a semicircular arch was desired, one side was drawn by hand to recede a little further from the centre than the compasses had left it. In a window five feet wide this variation would amount to a quarter or three-eighths of an inch, an amount quite sufficient, when used in conjunction with similar divergencies everywhere else, to be easily appreciated by the mind at a hundred feet and more; but insufficient to be perceived by the eye, as a piece of lopsidedness, at a distance of even ten feet.

Each step in a flight was usually bowed slightly outward, or, not to be too regular in the use of irregularities, some were bowed, some were given a wave shape, the middle and ends being in the same straight line, and some were made truly straight. In town houses a general bowing seems to have been preferred.

The walls of a room possessed two curves, one horizontal and the other vertical. The horizontal curve was a wave curve, the middle and ends of the wall being in the same straight line, and the portions on each side of the central protuberance being depressed. The vertical curve was effected, let us suppose, by plastering a wall to which the masons had given the horizontal curve wave shape somewhat thicker about a yard from the bottom than at the cornice and skirting. To conceal the means, while leaving the effect, a moulding was laid along the line of greatest thickness, forming a dado. The moulding was also bent in some way before nailing it on. Usually it was bent so as to be highest in the middle. The same curious and softening effect of a vertical and horizontal curve crossing also occurs in windows made during the eighteenth century period of art. It may be noticed in any six-pane sash manufactured before 1820. The slip that divides the upper panes from the lower ones was always bent so as to be highest in the middle. If the sills be examined, it will be found that they and the sashes, for both fit perfectly, bend slightly into the room.

The above list is sufficient, Mr. Moore considers, to make his thesis understood. Briefly, it is a restatement of the old formula that the line of beauty is curved, not straight; one of the unprovable axioms of art which, however, rests on the sufficient authority of Hogarth. The point may also be expressed by saying that the application of greater accuracy than is natural for an artist's hand to draw is not a means of imparting beauty, and if art-work is to be judged by the eye it must be executed by the eye, and only made by ruler and compasses if it is to be judged by ruler and compasses. Most of our modern decoration has to be made by ruler and compasses, for art patrons think they can do nothing more clever than examine a piece of decorative art, or an architect's design for mathematical symmetry and not for its mere æsthetic effect upon their eyes and nerves, or in the way they would examine a picture or a statue. In recommending generally the reintroduction of more spontaneous methods in the minor arts and their architectural equivalent, carefully prepared divergencies from the mathematically precise in what may, perhaps, be called the greatest of decorative arts, Mr. Moore does so on the expedient ground that much extra beauty results without extra cost.

The same principles may be applied also to thoroughfares, and, the author says, can any one imagine a walk which for its distance is more fatiguing than from the bottom to the top of the Champs Elysées? The eye has nothing to rest on except the great Arch, which for two-thirds of the distance is out of easy range of the eye, and is, therefore, an object of strain to it till one has nearly reached the top. The Strand, in London, with its pleasant bends to left and right, and little churches placed where it would otherwise appear too straight and vacant, is far more pleasant than this or any other of the pompous streets in Paris or America. These are the best examples which Mr. Moore can find to bring home to every reader the restful feeling to the eye and mind that is produced in all things by an infinitesimal departure from the mathematically precise—or, in more robust language, decorative art and rearrangements of Euclid's diagrams are not one and the same thing.

BRITISH AND DUTCH ARCHITECTURE IN SOUTH AFRICA.

ALTHOUGH South Africa is hardly the part of the world where one would expect to find examples of architecture, still those who travel to those far-away lands will be surprised and interested. Mr. Frank L. Emanuel has contributed the first of a series of articles in the English Architectural Review which gives valuable accounts of the prevailing methods of building adopted in South Africa, from which we condense the following: Possibly nowhere else may be seen so complete a chain of human habitations in actual occupation as in the group of countries referred to collectively as South Africa. The chain starts with the caves or the twig and mud huts of savages, and finishes with the lordly mansions of multi-millionaires, or with palatial business blocks, and there is no link of the chain missing between these two extremes. There are many causes to account for the variety in the architecture of the towns, notably the various elements in the composition of the population, the very varying nature of the sites on which they are built, and their corresponding variety of temperature. There are some towns of ancient origin, like Cape Town, while others tend to grow in the precocious manner of Johannesburg, which shot up in a night.

Adderley Street, Cape Town, is the handsomest in South Africa. It is broad, planted with trees, and lined with buildings which would adorn any European town. The business blocks are most substantial, and give an idea of wealth and prosperity. Adderley Street continues in a gentle ascent from the sea to the foot of the mountain, by way of Government Avenue. This shadowy tunnel of ancient oak trees, through which the sun splashes flecks of molten gold, is three-quarters of a mile in length, and is the chief promenade of the Capetonians. The Houses of Parliament are the pride of the city, and were erected in 1885, at a cost of $1,100,000. They are built of red brick, cement, and granite. The houses are generally of one story, flat-roofed, plastered, and washed with some pale color. Their only ornamentation consists in a heavy cornice of Dutch pattern. Many of these poorer houses have a stout wall built at right angles to and across the pavement, into which a shady seat is built. Here and there one comes across the modern villa, its garden of aloes, palms, and silver-leafs generally commanding a magnificent panoramic view of the town and bay. The Malay quarters round the Mosque are characteristically Oriental in appearance. There are numerous examples of those old Dutch warehouses and mansions which point to the affluence of their former proprietors. The Town House was built about 1760, and parts of the Castle date from 1666.

Inland we find quantities of happy little villages, with thatched and whitewashed cottages, with tall, small-paned windows with external shutters, and at Mobray is Cecil Rhodes' splendid residence "Groote Schuur." Kimberley, from an architectural point of view, is most disappointing, and has never raised itself above the status of an overgrown mining camp. The streets are broad, but it is rare to find anything along them superior to a one or two-storied brick and corrugated iron construction, plentifully adorned with details in the jig-saw order of architecture. The Malay quarter of the town consists of little mud and iron shanties, which congregate around scorching, irregular, open spaces. The villas erected around the park show evidence of a nascent desire for a better order of things.

THE NEW BUILDING OF THE UNIVERSITY CLUB, NEW YORK.

THE new building of the University Club, on the northwest corner of Fifth Avenue, at Fifty-fourth Street, New York city, is, without doubt, the finest edifice ever erected for club purposes. It is complete in every detail, and the luxury of club life can be enjoyed in no greater degree elsewhere. The University Club is composed of some of the best men which the city affords—men who bring to their various walks of life minds trained in universities and colleges. These men in time often become the trustees of the various institutions they have left, and the relations which they sustain to their alma mater render it necessary to have a club-house so arranged that small college reunions may be held without disturbing the economy of the Club as a whole. All these, and many more, problems were considered by the officers of the Club and the architects, Messrs. McKim, Mead & White, and the result amply testifies to their judgment. The building occupies part of the old St. Luke's Hospital site, and at first it appears to resemble an old Florentine palace, but a closer inspection will show softer lines. The façades are built of Milford granite, laid in rusticated courses. The three floors, with their mez-

zanine stories, are accentuated by mouldings which divide the building into three sections, thus avoiding monotony. Little balconies project out of the windows of the first mezzanine stories, and they are kept filled with flowers. The second floor has substantial balconies, supported by consoles, and provided with heavy bronze railings. Seals of the various colleges are inserted between the windows of the mezzanine stories, and the keystones of the arches are all sculptured. This is practically all the decoration until the cornice is reached. The cornice projects six feet over the line of the walls, and is self-supporting. Each of the three great stories is 25 feet in height, and the top, or banqueting floor is extended to 34 feet. The mezzanine stories are 10 feet high, and are used as bedrooms. The heating, lighting, and ventilating arrangements are most perfect, three blowers being used to force air in, while electric fans on the roof exhaust the foul air. In the basement are bowling alleys and shuffle boards, and a splendid Roman bath, with a plunge 20 x 50, is provided. The main hall is a fine apartment, treated in a severely classic style. The monoliths from Connemara are most beautiful, and rest on bases of white Norwegian marble; the capitals are bronze. The floor is laid with Italian marble, inlaid with colors. The walls are of real marble stucco. The lounging room is 100 feet long, 40 feet wide, and 25 feet high. The doorways and fireplaces are of Numidian marble, the woodwork is Italian walnut, and the walls are hung with old red velvet. The stairs are not treated as of prime importance, and doubtless the space is better utilized in other ways. The library consists of alcoves, with abundant stocking, and the gallery is reached by staircases. With the two studies at the ends, the library is 41 x 34 feet. The magazine room contains the periodicals. Ample facilities are given for quiet literary work, and a room where conversation is permitted enables the tastes of all to be suited. On the mezzanine story of the gallery floor is the pipe room and the card room. As is well known, pipe smoking is not permitted in most clubs, but in this room the brier and the meerschaum can be enjoyed. The dining-room or banquet hall, is a superb room, of the same size as the library except that it is 34 feet high. It is English Renaissance, and is admirably treated in English oak, richly paneled and carved, and space is left for mural decoration on the gilded ceiling. A musicians' gallery is in the upper part of the room. On the same floor is the trustees' room. Under the roof are the private dining-rooms, which are very useful for college reunions, as they can be thrown together. On the roof is a pavilion and a roof garden, where, in summer, meals will be served. The members of the Club should be congratulated on their fine new home, which we illustrate on page 27.

VIEW OF THE NASSAU HOUSE IN NUREMBERG.

NUREMBERG'S OLD NASSAU HOUSE.

THE mediæval atmosphere which everywhere pervades old Nuremberg is due largely to structures built during the sixteenth and seventeenth centuries. The later churches have for the most part been preserved; but the secular buildings have nearly all disappeared. The only one still standing is the *Schluesselfelder Stiftungshaus*, erroneously called "*das Nassauerhaus*," from the supposition that Adolf of Nassau once made it his residence. It cannot be accurately determined when the house was erected; but it was probably built about 1400, by the Steiner family. After it had changed owners many times, it passed into the possession of the Schluesselfelder family, the last representative of which left it, in the eighteenth century, to his nearest Nuremberg friends.

The Nassau house is a development of the later mediæval family towers (*Geschlechterthuerme*), found in Regensburg and in the Italian cities. There was no inner staircase, the upper stories being reached by a flight of wooden stairs on the exterior, which, in time of war, could be readily removed

The two lowermost stories were rebuilt in modern times and transformed as we now see them. It is said that originally they were provided with no entrances, and that they served only as magazines. The cellar, on the other hand, could be reached from the street by a manhole. The third story, with its beautiful eastern oriel, contains but a single large room, which served both as a festival hall and chapel. The original pointed-arch windows were superseded by rectangular windows as early as the sixteenth century. The fourth story contains rather bare living-rooms, immediately above which are a parapet and a protected passageway.

Although the interior of the Nassau house is not very remarkable, it cannot be denied that the exterior, especially on the east and south sides, is exceedingly effective. The most attractive feature is the unique, rich decoration of the parapet, which is heightened by four slender, graceful, hexagonal towers bearing the escutcheons of the seven electorate princes. The towers are also ornamented with various family arms and with the insignia of papal authority and of the city of Rome.

One of the most beautiful examples in Nuremberg of unity of architecture and sculpture is afforded by the light oriel on the eastern side, with its superposed lantern. The little reliefs with which it is ornamented represent scenes from the sufferings of Christ, and resemble those of the famous little oriel of St. Sebald. The angel at the corner of the house is a copy of the original figure which occupied the same position. See illustration on page 21.

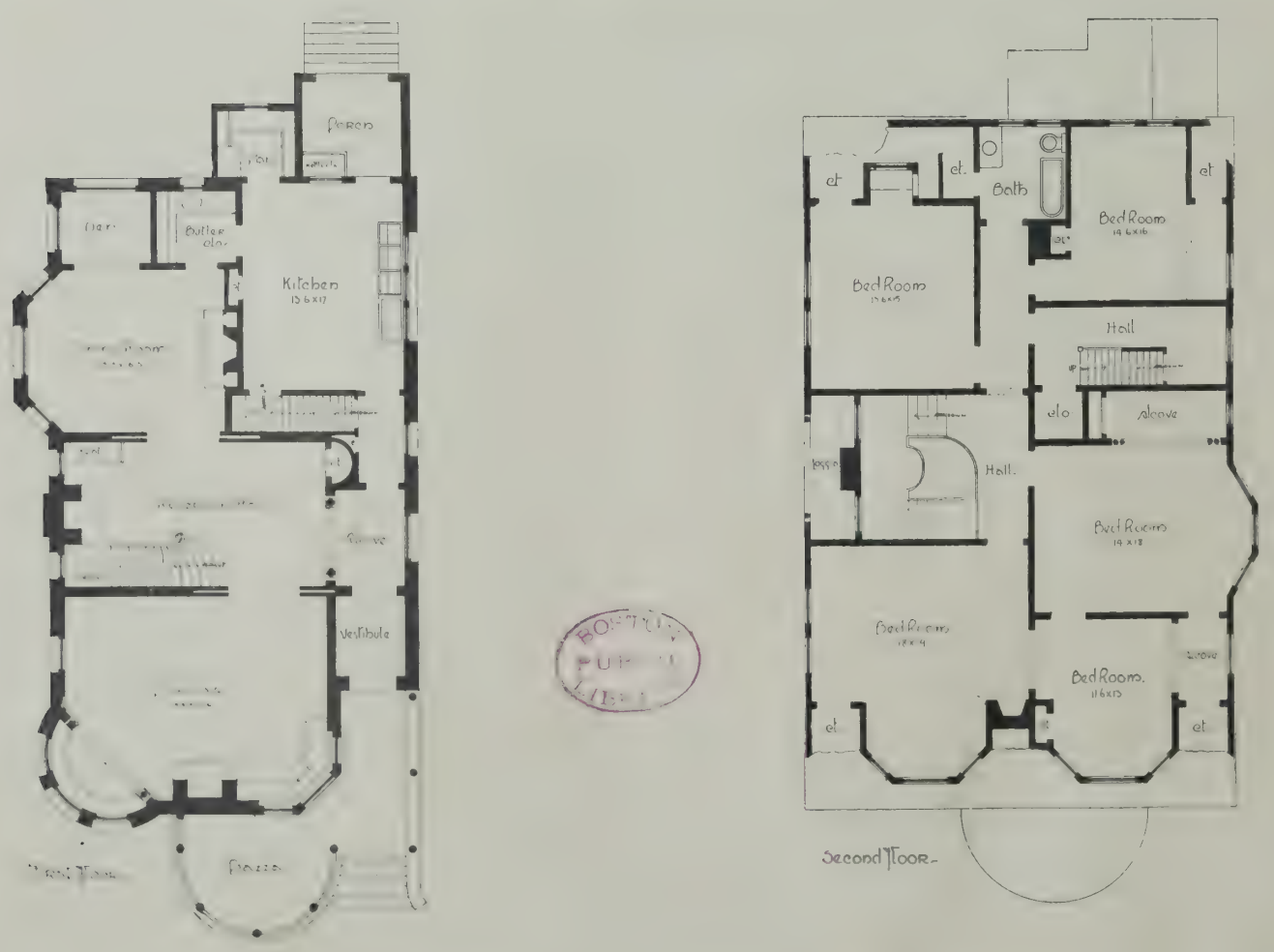
Of particular interest and importance is the architectural construction of the roof. The walls are continued above the cornice for a short distance. Probably there always was a permanent protecting roof on the building, as the construction of the towers would indicate, even though other Nuremberg patrician houses of the seventeenth century were built with a parapet, but without any roof. The parapet, with its embrasures, is not of great thickness, so that a passageway is left above the protected platform. The roof is unconnected with the lower timbers of the platform, and is built not directly on the battlements, but on posts connected behind the battlements.

Unfortunately the lower story of Nassau house has been rebuilt to provide a shop, as the building happens to be situated in a very good business quarter. This well-nigh sacrilegious transformation received well-merited censure from the German press, and was one of the causes for a law which in future will prevent citizens from wilfully changing the historical and artistic monuments of the city. It is to be hoped that this wise decree will preserve what is still left of the old Nassau house.—Blaetter fuer Architektur und Kunsthandwerk. Verlag von Julius Becker, Berlin, SW.

A COLONIAL RESIDENCE AT HARTFORD, CONN.

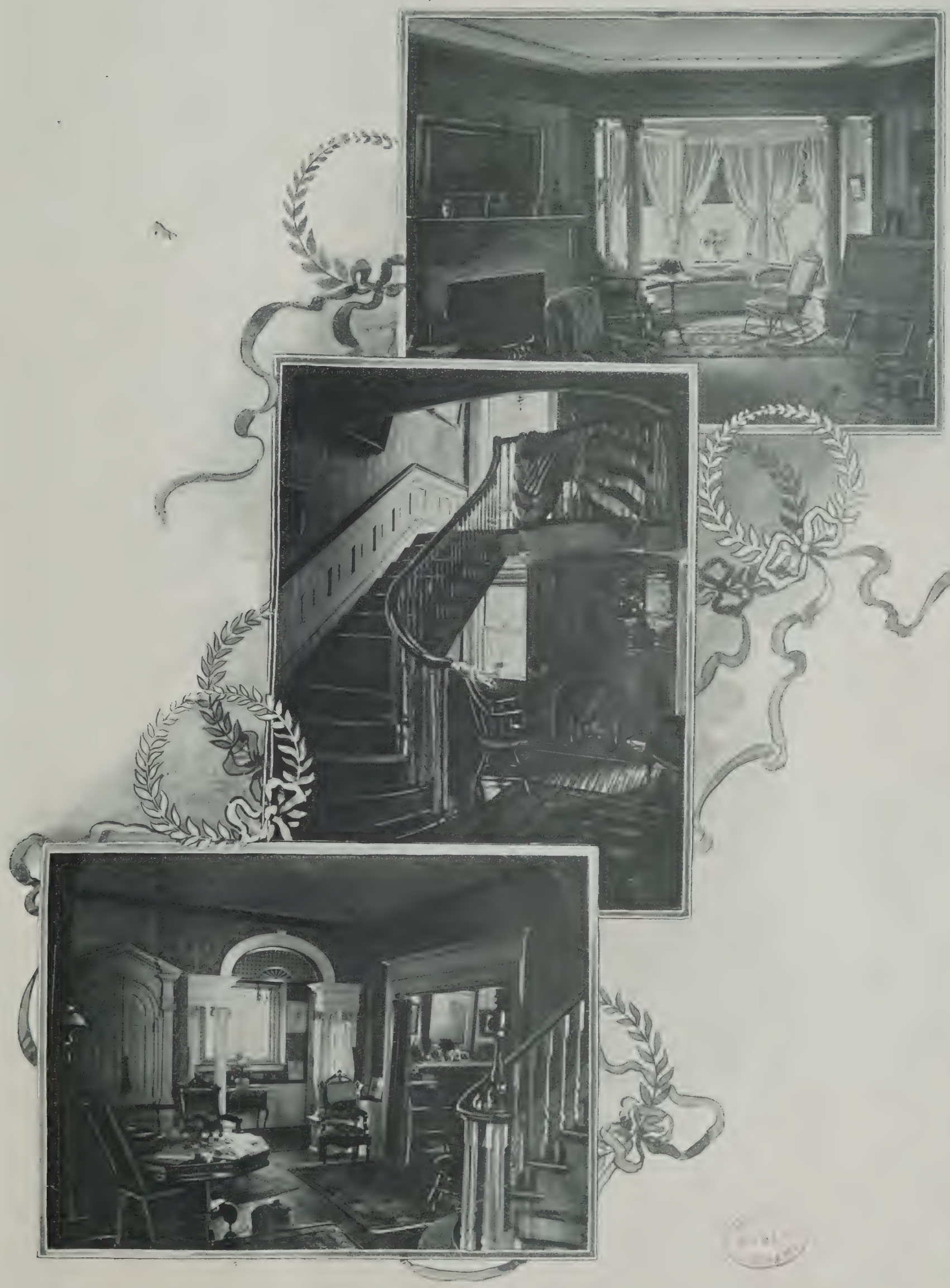
WE present herewith, in this issue, on pages 24 and 25, a residence which has been erected for Mr. Hitchcock, at Hartford, Conn. The design is treated in the Dutch colonial style, with gambrel roof and colonial detail. A striking feature of the exterior is the porch at front, with its fluted columns and Ionic capitals. The underpinning is constructed of brown-stone ashlar, laid in courses. The first story is built of red brick, with brown-stone trimmings. The superstructure above is constructed of wood and then covered on the exterior with shingles and stained a Van Dyke brown with white trimmings. The roof is covered with shingles, and is stained a moss green. Dimensions: Front, 33 ft. 10 in.; side, 61 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. The entrance is through a vestibule, into another lobby, or alcove, which is separated from hall proper in a most artistic manner, with Ionic columns extending up to and supporting an archway, circular in form. An excellent feature is the entrance to kitchen, through private hall. This lobby and main hall is trimmed with white pine and treated in white enamel. It contains a nook with paneled seats and an open fireplace built of brick, with facings and hearths of tiles, trimmings of wrought iron, and a mantel of excellent design. The staircase is an ornamental one, with a graceful sweep at the bottom, with newel formed of a cluster of balusters, all of which are treated in white, with the exception of the mahogany rail. The parlor is an attractive apartment, and is treated same as hall. It contains a nook separated from parlor, with an archway provided with columns and paneled seat; this parlor also contains an open fireplace, with paneled seat sweeping around from same. The fireplace has a tiled hearth and facings, and a mantel with columns. The dining-room and den are trimmed with quartered oak; the former contains a fireplace and sideboard combination built in an unique manner, with tiled facings and hearths and leaded glass cabinets for china at side and over mantel shelf. The floors in these apartments are of oak, laid in narrow widths. The butler's pantry is trimmed with quartered oak, and it contains bowl, shelves, drawers, and cupboards. The kitchen is wainscoted and furnished with a maple floor and all the modern improved fixtures. The second and third floors

(Continued on page 36.)



A COLONIAL RESIDENCE AT HARTFORD, CONN.—See page 23.

MR. WILLIS E. BECKER, ARCHITECT.



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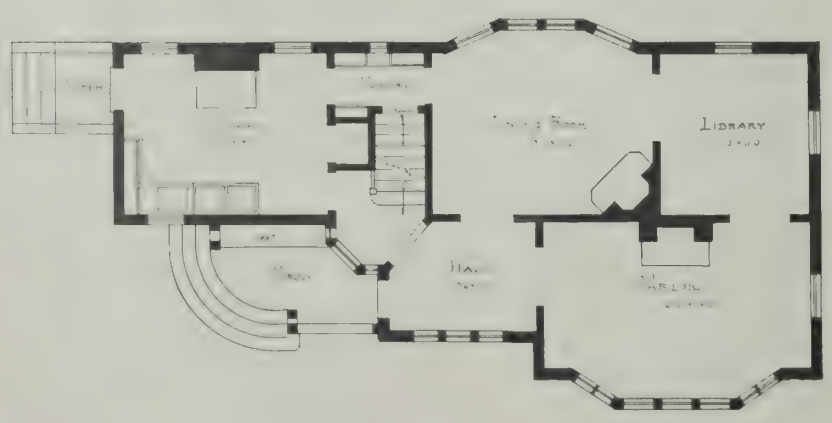
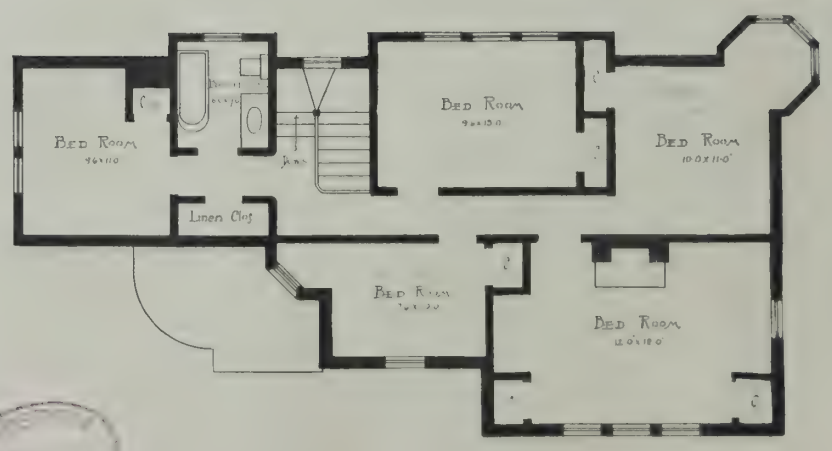




Second Floor Plan

AN ENGLISH HOUSE AT FLATBUSH, LONG ISLAND.—See page 36.

MR. JOHN J. PETIT, ARCHITECT.

1. Main Drawing Room. 2. Main Hall and Library. 4. Exterior. 5. Dining-Room. 6. Pompeian Room. 7. Pipe Room. 8. Council Chamber.

NEW BUILDING OF THE UNIVERSITY CLUB, NEW YORK CITY.—See page 22.

MESSRS. McKIM, MEAD & WHITE, ARCHITECTS.

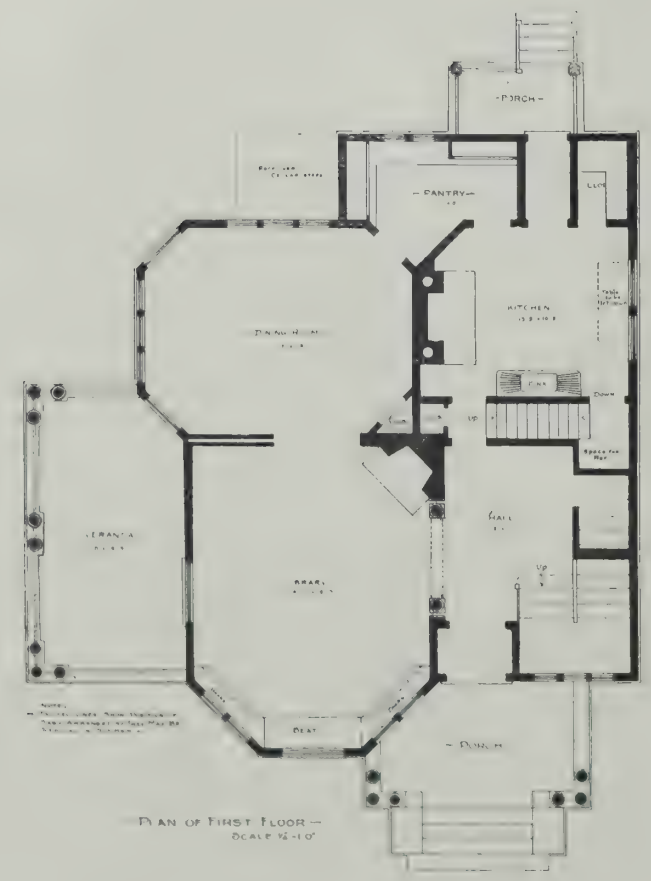
BOSTON PUBLIC

A MODERN RESIDENCE AT NEW HAVEN, CONN.—See page 36.

MR. JOSEPH W. NORTHROP, ARCHITECT.

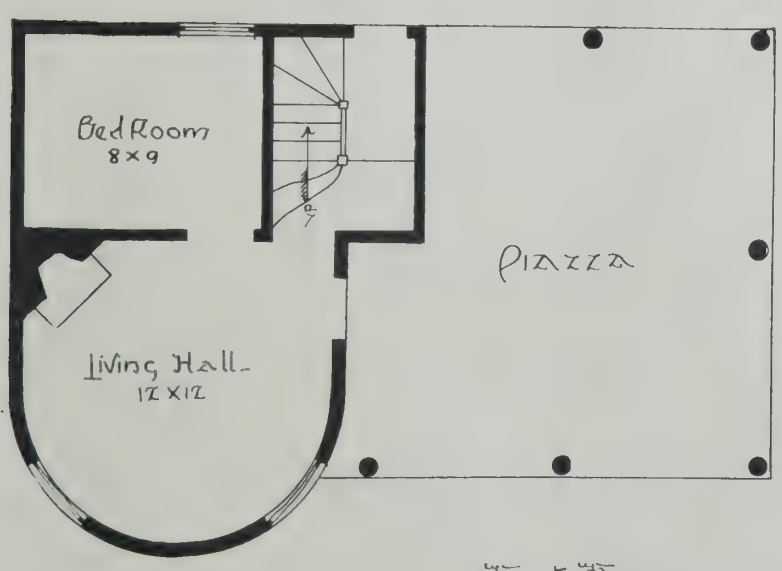
A MODERN RESIDENCE AT NEW HAVEN, CONN.—See page 36.

MR. JOSEPH W. NORTHROP, ARCHITECT.

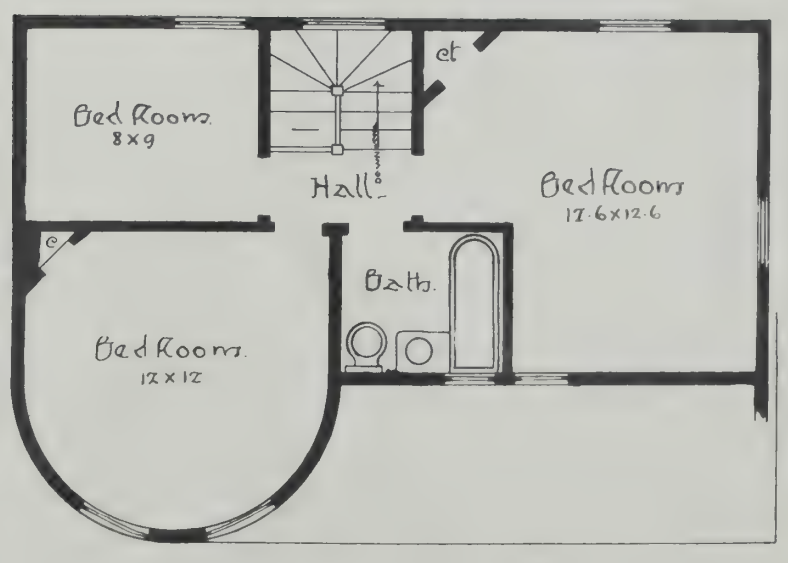


A MODERN DWELLING AT MOUNT VERNON, N. Y.—See page 36.

MESSRS. CABLE & LUCAS, ARCHITECTS.



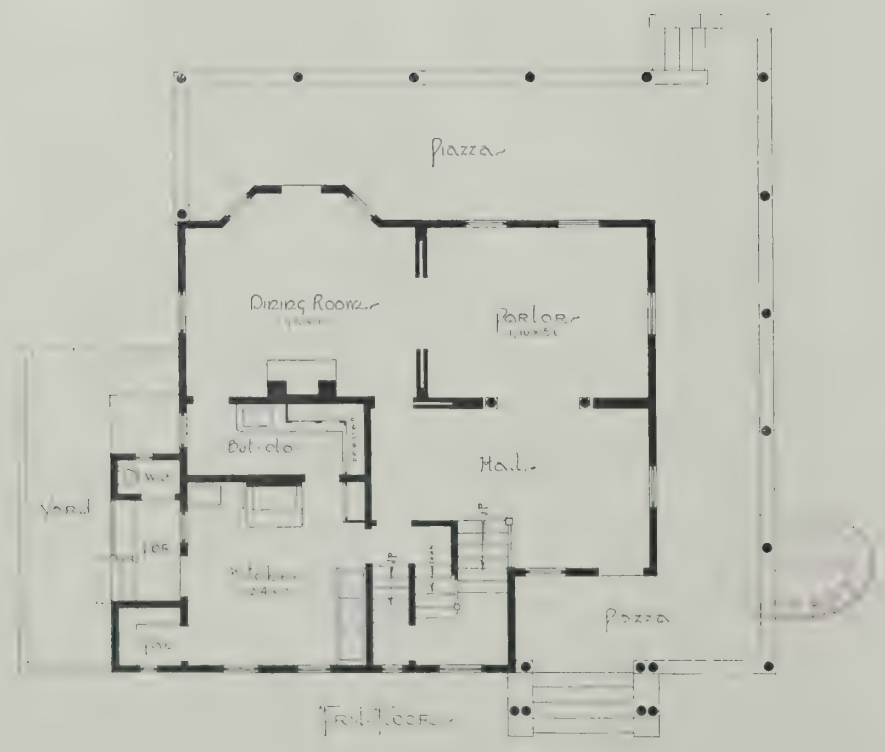
First Floor.

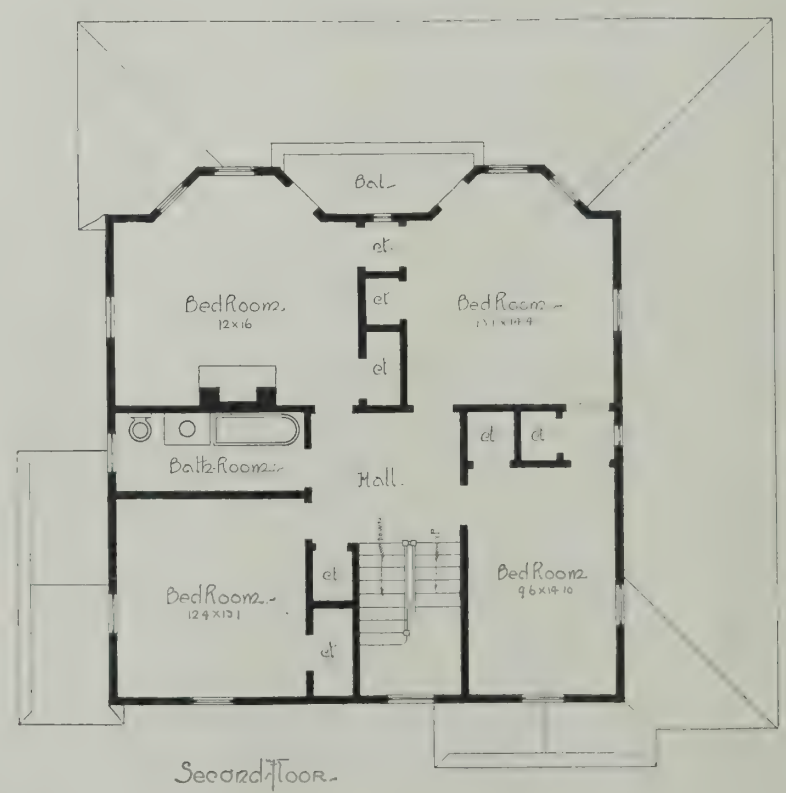


Second Floor.

A MODEL SUMMER COTTAGE AT DEAL BEACH, N. J.—See page 36.

MR. WILLIAM G. MASSARENE, ARCHITECT.





A RESIDENCE AT HOLYOKE, MASS.—See page 36.

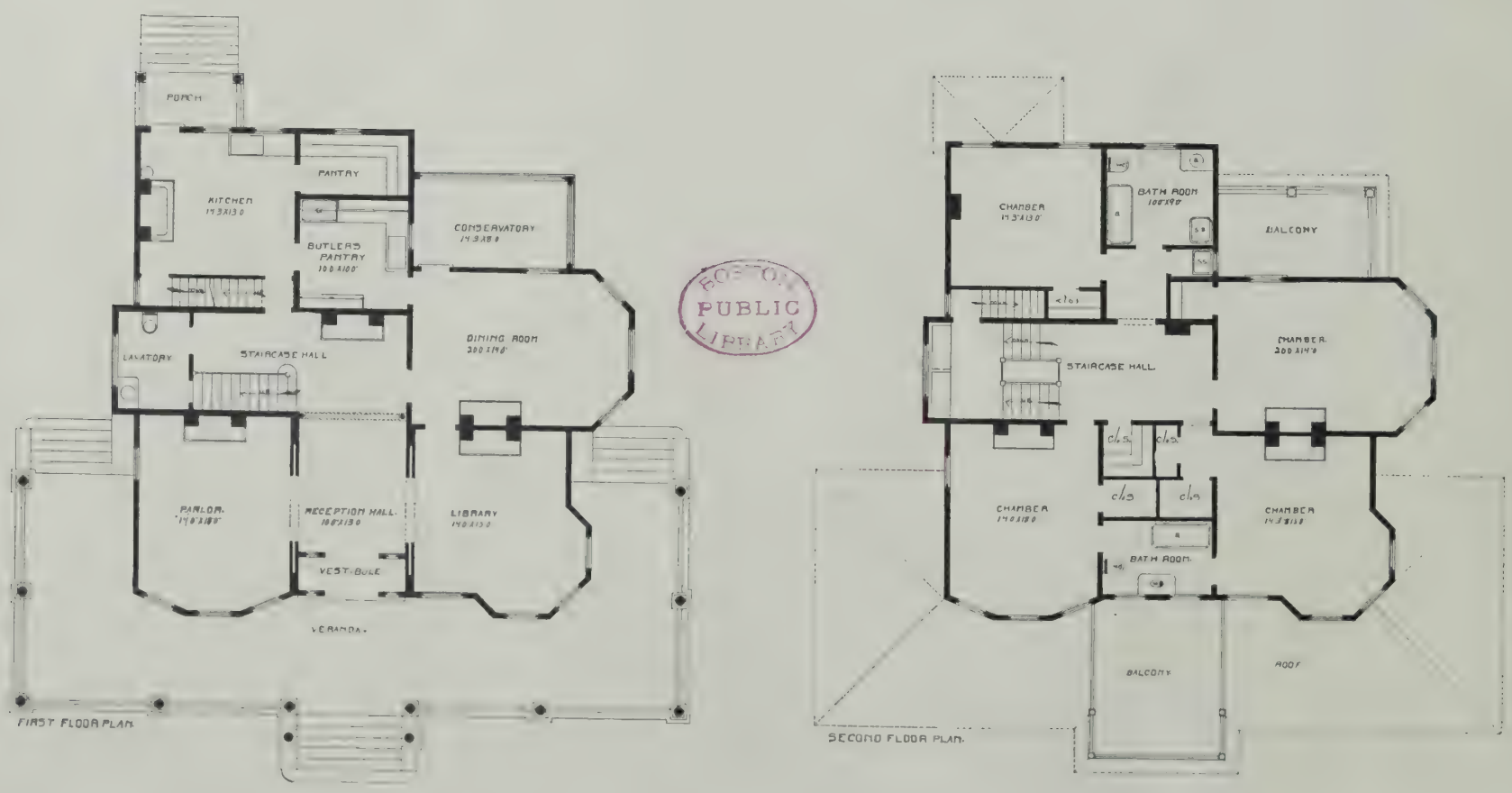
MR. GEORGE P. B. ALDERMAN, ARCHITECT.

First Floor

Second Floor

A SUMMER RESIDENCE AT SEA GATE, LONG ISLAND.—See page 37.

MESSRS. PARFITT BROTHERS, ARCHITECTS.



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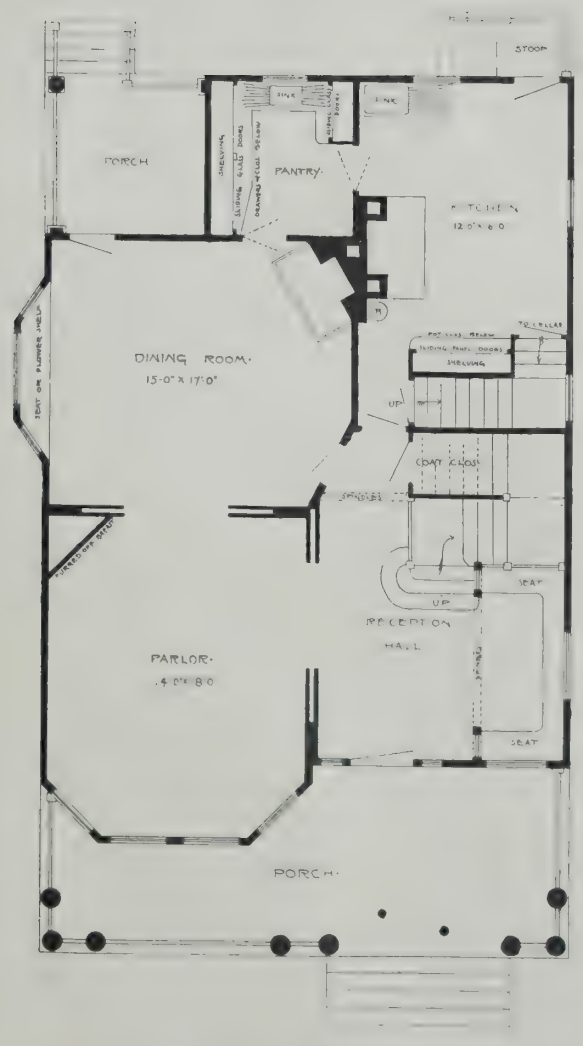
A MODERN DWELLING AT PELHAM HEIGHTS, PELHAM, N. Y.—See page 36

MR. A. M. JENKS, ARCHITECT.



FIRST STORY.

SECOND STORY.

A MODERN DWELLING AT MOUNT PROSPECT AVENUE, NEWARK, N. J.—See page 37.

MR. CHARLES P. BALDWIN, ARCHITECT.

BOSTON PUBLIC LIBRARY

A COLONIAL RESIDENCE AT HARTFORD, CONN.

(*Continued from page 23.*)

are trimmed with white pine, and treated in colors. The second floor has Southern pine floors, and it contains five bedrooms, with numerous alcoves with ornamental columns, and a bathroom which is wainscoted with quartered oak and fitted up with porcelain fixtures and exposed nickel-plated plumbing. The third floor contains two bedrooms and ample storage room complete. A cemented cellar contains furnace and other necessary apartments. Cost, $7,500. Mr. Willis E. Becker, architect, 756 Main Street, Hartford, Conn.

Our engravings were made direct from photographs of the building taken specially for the Scientific American.

AN ENGLISH HOUSE AT FLATBUSH, LONG ISLAND.

The engravings shown on page 26 in this issue illustrate a modern dwelling house of English half-timbered treatment, which has been recently erected for Mr. F. Luck at Flatbush, Long Island. The design is admirable; it has unusually attractive elevations, combined with an interior arrangement which is most excellent. The building was designed especially for a triangular plot of ground, as is shown by the outline on plan, and to solve such a problem is not only a difficult matter, but it required much study on the part of the architect. Mr. Petit has evidently been successful in carrying out the scheme, as is shown by the design presented herewith. The subject is worthy of especial mention in this particular respect, as a good example for house builders having similar plots of ground, which apparently prove worthless to them. The building from grade line to second story is built of brick, laid up in a neat manner with red mortar. The building above is beamed, forming panels. The beams are of cypress stained oak, and the panels are painted light yellow. It is intended to plaster these panels. The roof is covered with shingles. A feature of the first story is the windows, which are provided with transoms glazed with leaded glass. Dimensions: Front, 44 ft.; side, 26 ft. 6 in. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in. The hall is treated in an unique manner; the walls and ceilings are paneled with ash, and are stained and finished off in the Flemish style. The staircase is separated from hall proper by an archway, and as there is but one stairway to second floor, it is within easy access to the kitchen department. The parlor and library are treated with white enamel, and the former contains an open fireplace with cream white tiles for facings and hearth, and an Elizabethan mantel of excellent design. The dining-room is trimmed with ash, and it contains a paneled wainscoting and an open fireplace with tiled trimmings and an Elizabethan mantel. This room is treated in the Flemish style. The kitchen and pantries are trimmed with cypress, and are furnished with the best modern conveniences. The kitchen contains two wash-trays, sink, hearth for range, etc. The second floor is trimmed with cypress finished natural. It contains four bedrooms, large closets, bathroom, and one servant bedroom. The bathroom is wainscoted and furnished with porcelain fixtures and exposed nickel-plated plumbing. The bedroom over parlor has a domed ceiling rising up into ceiling. The cemented cellar contains furnace and other necessary apartments. The building cost $3,500, including furnace, grading, and everything complete ready for occupancy. Mr. John J. Petit, architect, 186 Remsen Street, Brooklyn, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODERN RESIDENCE AT NEW HAVEN, CONN.

We present on pages 28 and 29, in this issue, a modern residence which has been recently completed for Merritt W. Burwell, Esq., at New Haven, Conn. The engravings show a residence of great beauty, the elevations being well handled, the detail excellent, and the whole presenting a stately and dignified appearance. The exterior is treated in the chateau style of French Renaissance architecture of a modernized type. The underpinning is constructed of rock-faced sandstone. The superstructure is built of old gold Roman brick, with red sandstone trimmings. The cornice, mouldings, cresting, and finials are of copper. The roof is covered with red slate. Dimensions: Front, 48 ft.; side, 58 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 11 ft.; second, 10 ft.; third, 9 ft. The plan is most excellent. The hall and vestibule are trimmed with quartered oak. The vestibule has a paneled wainscoting and a tiled floor. The hall has also a paneled wainscoting and a hardwood floor. It contains an ornamental staircase, with massive carved newel posts, spindle balusters, and rail. A very beautiful stained glass window, made by Tiffany, is placed at second landing of staircase. A lavatory is located conveniently at porte-cochère entrance. The reception-room, circular in form, is treated with white enamel in a dainty manner. The sitting room is trimmed with sycamore and the library with cherry. Both have open fireplaces, trimmed with tiled hearths and facings, and carved mantels made from special design. The dining-room is trimmed with quartered oak. It has a paneled wainscoting and hardwood floor. The china closet, kitchen, and rear hall are most conveniently arranged, and are fitted up in the best possible manner with the usual fixtures. The kitchen has plenty of large pantries, lobby large enough to admit ice-box, sink, and fireplace for range. The rear hall contains a dumb-waiter, leading from cellar to third floor. The second story is trimmed with white maple, cherry, oak and ash, respectively. It contains six bedrooms, ten closets, sewing-room and bathroom. The bathroom has a tiled wainscoting and a floor paved with unglazed tile, and it contains a porcelain bathtub and fixtures and exposed nickel-plated plumbing. The third floor contains a billiard-room, smoking-room, and servants' quarters. A cemented cellar contains furnace, laundry, and other necessary apartments. Mr. Joseph W. Northrop, architect, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODERN DWELLING AT MT. VERNON, N. Y.

The engravings shown on page 30, in this issue, illustrate a modern dwelling which has been erected for Melville Kerr, Esq., at Mt. Vernon, N. Y. The design is treated with Colonial detail, with latticed window effects, and the whole general appearance is attractive and pleasing. There are many good features, including the bay windows, porch at front, and the conservatory at side. The underpinning is built of red brick laid up in red mortar. The building above is covered with sheathing, paper, and then shingles, left to finish in their natural state, while the trimmings are painted cream white. The roof is covered with shingles and treated similarly. Dimensions: Front, 32 ft.; side, 39 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The interior is treated in a handsome manner. The hall, library, and dining-room are trimmed with white pine, treated in ivory white enamel. The doors are stained and finished in mahogany. The hall is treated in an unique manner. It contains an ornamental staircase, with turned newel and balusters, with mahogany rail and a paneled wainscoting. The opening between hall and library, provided with Colonial columns, is a good feature. This library is provided with bookcases and seats, built in, an open fireplace built of Roman brick, with hearth and facings of the same, and a mantel shelf supported upon wrought-iron brackets. The trimmings to fireplace are also wrought-iron. The dining-room is octagonal in shape, and is provided with clusters of latticed windows, and a china closet built in, with latticed glazed doors. The kitchen and its apartments are fitted up in a most complete manner. The second floor contains three bedrooms, large closets, dressing-rooms, and bathroom. This floor is trimmed with cypress and finished natural. The bathroom is paved and wainscoted with tiles, and is provided with porcelain fixtures and exposed plumbing. The third floor contains two bedrooms and ample storage. A cemented cellar contains laundry, furnace, and other necessary apartments. Cost, $4,000, complete. Messrs. Cable & Lucas, architects, No. 1183 Broadway, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODERN DWELLING AT PELHAM HEIGHTS, PELHAM, N. Y.

We present on page 34 a modern dwelling which has been erected for Dominick Smith, Esq., at Pelham Heights, Pelham, N. Y. The design has excellent elevations, with good detail, and well-arranged plans. The underpinning is built of gray granite, rock-faced, laid up with random joint. The superstructure is sheathed and papered on the exterior, and then covered with clapboards and painted a bottle green, while the trimmings are painted a light cream. The roof is covered with shingles and stained a moss green. Dimensions: Front, 48 ft.; side, 43 ft.; not including piazza. Height of ceilings: Cellar, 9 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The plan is most excellent, and it has a piazza across the front and return at side eleven feet in width, which is excavated underneath, walled up, and providing ample storage room. The entrance is through a vestibule provided with a tiled floor and a tiled wainscoting; the walls above the tiled wainscoting are paneled with quartered oak. The reception and staircase halls are trimmed with old English oak, and each is separated one from the other by an archway supported upon fluted columns with Ionic capitals. At the end of hall looking from entrance there is an open fireplace built of red Roman brick laid up in black mortar and provided with a mantel of oak, with shelf running across the front and around both sides, with columns and Ionic capitals. The staircase is built of old English oak, and is provided with paneled newel posts, moulded rail, and turned balusters. Beneath these stairs a lavatory is provided, containing all the conveniences. The parlor is trimmed with oak and finished in white enamel. It contains an open fireplace, with tiled hearth and facings, and a mantel with columns and mirror. The library and dining-room are trimmed with dark English oak, and are furnished with open fireplaces with tiled facings, and hearth and mantel to correspond with trim. The conservatory off the dining-room is an attractive feature. The floors throughout are laid with hardwood and finished in wax. The kitchen is trimmed with N. C. pine, and is wainscoted and furnished with all the best modern conveniences, with Richardson and Boynton double-oven range built in, an 80-gallon boiler, etc. The kitchen pantry is fitted up with shelving in the usual way, with drawers and cupboards under the counter shelf. The butler's pantry is finished in N. C. pine, and is provided with an ice-box and dressers, with swinging sash doors, with drawers and cupboards. The second floor is trimmed with red cypress of even color and treated in the natural wood with a dead finish. This floor contains four bedrooms, five closets, linen closet, and two bathrooms, the latter wainscoted and furnished with porcelain fixtures and exposed plumbing, all nickel-plated. Each bedroom on this floor has an open fireplace with a tiled hearth and facings, and neat wooden mantel. The third floor contains four bedrooms, trimmed with red cypress. The house is lighted by gas and electricity, is heated by the hot-water system, and provided with speaking tubes and electric bells, etc. A cemented cellar contains laundry, furnace-room, and other necessary apartments. Cost, $8,500. Mr. A. M. Jenks, architect, Mount Vernon, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODEL SUMMER COTTAGE AT DEAL BEACH, N. J.

The engravings shown on page 31, in this issue, illustrate a model summer house, which has been erected recently for the Deal Country Club, by the Atlantic Coast Land Company, at Deal Beach N. J. We have illustrated several of the cottages of the Deal Country Club in our preceding issues, giving a general description of same. The design we present is built after the same plan, but of a different exterior elevation. There is no cellar under house, which is built for summer use, it being erected upon cedar posts with stone footings. The building from grade line to roof is covered with sheathing on the exterior and then shingles, left to weather finish a dull brown color. The trimmings are painted white, and the roof is covered with shingles and stained a reddish brown color. The plan shows a spacious piazza, and a living room, containing an open fireplace built of brick, with hearth and facings of same, and the whole finished with a neat wood mantel. This floor also contains a bedroom and a stairway hall, with staircase of ornamental design complete. The second floor contains three bedrooms and bathroom, the latter wainscoted and treated in white, and fitted up with porcelain fixtures and exposed nickel-plated plumbing. The trim throughout is of mitred whitewood, treated in ivory white. The floors are of hard pine. Mr. William Gardner Massarene, architect, Deal Beach, N. J.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A RESIDENCE AT HOLYOKE, MASS.

The engravings shown on page 32 in this issue illustrate a residence which has been erected for Mr. A. Stieger at Holyoke, Mass. The design is excellent, and it combines both pleasing elevations and well-arranged interior plans. The underpinning is constructed of brick, laid up in red mortar. The superstructure, constructed of wood, is covered with sheathing, paper and clapboards, and painted a silver gray, with white trimmings. The roof is shingled, and stained a moss green. Dimensions: Front, 39 ft.; side, 49 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior plan is perfect in its arrangement, and the whole is finished off in a very artistic manner. The first floor is trimmed with hardwood finished natural. The second floor is trimmed with white wood, and is treated in colors to match wall decoration. The main hall contains a very elaborate staircase, with newel posts and balusters of excellent design. A large coat closet is provided beneath staircase. The parlor and sitting-room open from hall with double sliding doors, the den from rear hall and sitting-room. Both den and sitting-room have open fireplaces trimmed with tiled hearths and facings, and mantels. The rear hall and toilet are conveniently located, with outside entrances thereto. The dining-room, of good dimensions, is provided with a large butler's pantry fitted up with cupboards, closets, dresser, drawers, etc. The kitchen is wainscoted, and fitted up complete with the best modern fixtures. The second floor contains a den, six bedrooms with large closets, and a bathroom, wainscoted and furnished with porcelain fixtures and exposed nickel-plated plumbing. The third floor contains two bedrooms and trunk room. This floor is particularly well lighted by numerous dormer windows. The cemented cellar under building contains furnace, laundry, and other necessary

apartments. Cost $7,500, including furnace and everything complete. Mr. Geo. P. B. Alderman, architect, 271 High Street, Holyoke, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A SUMMER RESIDENCE AT SEA GATE, LONG ISLAND.

THE illustrations on page 33 in this issue present the summer residence of John J. Gunther, Esq., at Sea Gate, Long Island. The design presented is of a striking appearance, and it has many excellent features, including a spacious piazza, balcony, and an outlook at third floor. There is a cellar provided under part of building, with a cemented floor, and it contains a store room, bicycle room, toilet room, and two bath houses. The soil being a sandy one, there is no stone foundation. The building rests upon posts, and the cellar walls are formed of planking nailed on to the outside of posts. The exterior, from grade to peak, is covered with sheathing and shingles, and left to weather finish a natural silvery gray color, while the trimmings are painted white. The roof is shingled and finished similar. Blinds painted bottle green. The interior throughout is trimmed with white wood and finished natural. The hall has a hardwood cornice, and contains an ornamental staircase, lighted effectively by a stained glass window. The parlor is separated from this hallway by an archway and columns of Colonial design. The dining-room has a bay-window and an open fireplace trimmed with tiled facings and hearth, and a Colonial mantel with columns. The kitchen and pantry are well fitted up with the best modern fixtures complete. The second floor contains four bedrooms and bathroom, the latter being wainscoted and furnished with porcelain fixtures and exposed plumbing. The third floor contains three bedrooms and trunk room. Cost, $4,000 complete. Messrs. Parfitt Bros., architects, 26 Court Street, Brooklyn, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN DWELLING AT MT. PROSPECT AVE., NEWARK, N. J.

THE engraving presented on page 35 illustrates a modern dwelling recently erected for Col. William S. Righter at Mt. Prospect Avenue, Newark, N. J. The design presented is of an attractive character, and it is treated in the Colonial style of architecture. The underpinning and chimney where exposed to view are built of rough vitrified brick, with joints raked out. The exterior framework above is covered with clapboards, and then painted Colonial yellow with white trimmings. The roof is shingled and left to weather finish. Dimensions: Front, 30 ft.; side, 43 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior arrangement is excellent. The reception hall is trimmed with cypress and treated natural. It contains an attractive nook with seats and spindle-work transoms, and an ornamental staircase with newel posts and balusters turned out of similar wood. The parlor is treated with china white. It contains a false fireplace with chimney-breast furred out and provided with mantel. The dining-room is trimmed with cypress treated natural, and it has a bay window thrown out with flower shelf, an open fireplace trimmed with tiled facings and hearth, and mantel, and a porch at rear. The kitchen and pantries are trimmed and wainscoted with white pine and are fitted up with the usual fixtures complete. The second floor contains four bedrooms, with large closets and bathroom. One bedroom is treated in china white, while the remainder is trimmed with white pine and cypress. The bathroom is wainscoted and furnished with porcelain fixtures and exposed nickel-plated plumbing. The third floor contains three bedrooms and storage. A cemented cellar contains steam heating apparatus and other necessary apartments. Mr. Charles P. Baldwin, architect, Prudential Building, Newark, N. J.

Our engraving was made from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

Imperfect Execution.

"TAKE most pains with the best material," says Ruskin—a maxim that may profitably be remembered by the artist, especially by those who are apt to throw away the highest effort on the meanest subjects. The contrariwise is also true in another sense. We are continually seeing the least pains taken with the execution of designs that have cost their authors much study and labor. Many of our most elaborate and costly buildings have been constructed of perishable stone, or have come to grief by the yielding of a bad foundation or the collapse of a girder. Even the painter of talent has sacrificed his reputation by the use of inferior pigments. But few of our buildings exhibit this consistency—the carrying to completion of a good design; it somewhere fails. Is not this inconsistency due to the hurry of building?—a clever idea is spoilt by being contracted for by the lowest bidder; a good design is lost upon us. Is not the want of sincerity the fault of most modern works? We seek for an explanation.

How frequently the most correct science fails by an imperfect application or a faulty experiment, and the scientific constructor is frustrated in his work through a defective execution. In theory a number of accurately cast iron columns, with planed caps and bases, will give the most perfect result, the centre of pressure being truly placed; but how often imperfect workmanship will render a series of these superimposed columns abortive, and the whole collapses! Just an unequal casting or shrinkage on one side, or an unevenly planed bed, will cause the failure. A stone pillar of ample size has often been cracked or crushed through an inaccurate squaring of the beds, or the want of a thin layer of lead or pine to equalize the pressure. As with physical matters, so with the success of design. It is a matter largely of execution, of a true and faithful rendering of the spirit of the design, of the accuracy displayed in interpreting the architect's intention, of a careful employment of the material, of a sympathetic handling and workmanship.

The most learned theorist of construction is often the least qualified, through various circumstances, to make a successful builder. He has not had a practical training; his ideas are derived from treatises and experiments in the classroom; his knowledge of stone, timber, and iron are imperfect, because they have not been supplemented by workshop experience. We can multiply instances of the uselessness of a knowledge of stresses and strains to a bridge or roof builder. How many iron girder or rib bridges designed on mechanical principles with the stresses proportioned to external "dead" and "live" loads, have failed through a defective joint—to punched or drilled bars and flanges, even to weak riveting! These minor defects have rendered the niceties of calculated stresses absolutely of no value whatever. The practical constructor who has ignored these refinements of design, but has allowed a larger margin of strength in his web and flanges, has erected structures that have withstood the heaviest working loads.

Can we not appeal to the builders of our great stone and brick structures of Roman and mediæval times? Without paucity or stint of material they erected edifices that have withstood the disintegrating action of weather, of time, and even of earthquake, for centuries. Massive walls and buttresses, needlessly thick and deep, according to theory, were built to sustain vaults of great weight and thickness. Superfluous strength, no doubt, they possessed; but it was better than collapse. The system of inert stability which characterized the Romanesque structure was superseded by the Gothic system. The principle of the equilibrium of forces was introduced, but great depth of the buttresses at intervals took the place of the continuous solid wall. So here, again, we have an ample margin of strength. Viollet-le-Duc speaks of this framework of masonry rendered solid by the "combination of oblique resistances or of vertical weights," and enveloped in a garment which clothes it. Every edifice has its skeleton and its sinews; it is a structure of stone, independent of the garment that covers it. The skeleton is rigid, as we see in such a building as the choir of Notre Dame at Chalons-sur-Marne. Look at the deep buttresses between the semicircular chapels, the two rows of inner piers which form the apse or chevet of this beautiful church. Even when experience had taught the mediæval builders to erect lighter structures, care and skilful execution went hand in hand with the design.

We take later periods with the same result; the building of the era known as the Renaissance; the work of our own Classic revivalists of the seventeenth and eighteenth centuries; even the Georgian period of our English architecture, with all its faults and heaviness. No one will deny that the buildings of that age were at least honest and sound in construction and workmanship. Every builder and architect who has had to restore or rebuild houses or public edifices of this date is aware of the solidity and soundness of the workmanship, showing that the workman had not lost all his interest in his craft. We look with admiration on the brickwork, the joinery, the solid doors, the hand-wrought mouldings, the plaster work of these buildings; our students still make drawings from measurement of these houses of our grandfathers, where they still find lingering the "perfection of work and personality in the workman."

We have lost all this care and skilfulness in execution. Why? Is it because, as Emerson says, we are "reckoned in the gross," or because we have grown more careless? The specification and supervision of the architect have an intimate bearing on this question of execution. Are we sure they are what they were once, that the specification and quantities are really part of the contract, or treated as superfluous documents not to be enforced; that the superintendence of the architect is a mere perfunctory duty delegated to some one else? The latter questions must be answered in the affirmative. To some extent machine-turned-out masonry and joinery is responsible in the answer to the question. Do we see the design *in* the execution? Is the execution—a continuation of the architect's intention—the honest fulfilment of the design on paper, instead of being something else entirely—something that the contractor and workmen have given us, that the artist has had nothing to do with? We look at our commercial buildings, our great shops, restaurants, warehouses, our domestic dwellings; they are more or less faint representations of what they are intended to be; everything is scamped or pinched, the ornamental details meagre. Let us search for a remedy.

For thoroughly honest and consistent execution the architect has to rely upon those who work under his control. He must get a body of skilled, conscientious builders, masons, bricklayers, carpenters and joiners, plasterers, and smiths to carry out his details. He fails because he has not such a body of craftsmen. He gives a design for a piece of stonework, but the mason seeks to find "short cuts"; the substance or depth of the bed is reduced to save a few inches of stone, also the projection of a cornice or a moulding, with the result that the appearance is spoilt, the work looks niggardly and thin. Do we not find it so in such details as window tracery, moulded work, quoins, buttress weatherings? And is the bricklayer less unscrupulous? Does he not rob the proportions of a chimney-shaft by omitting a few courses, introduce patterns of bricks that happen to be in stock for specially made moulded courses? Does he not spoil his work by following what he thinks is easier bond in setting out the windows? How often the carpenter or joiner completely travesties the meaning of the architect's detail by reducing the thickness of the material, by putting stock in trade or machine-made mouldings for those designed, and by altering some proportion of the detail upon which the architect relied for his effect! All these things are of common occurrence, especially when the work is done by contract, or left to a clerk of works or foreman to see carried out. Sometimes, of course, the architect is to blame for not making details, or neglecting the work during its progress, and it cannot be laid to the workman's charge that he has simply carried out the work in the way he has always been in the habit of doing. These are all strong reasons why building craftsmen should, if possible, so master their arts that they may, each in his own way, contribute to the design by taking an individual interest in the details. It will be some time before this happy state of things will be reached. One author of a recent paper read before the Architectural Association proposed that the decorative work required in a building instead of being handed over to commercial firms, might be intrusted to the various men who have made these crafts their own—a good plan, if we could bring back the traditions and system of the Middle Ages, not otherwise. Imagine a number of joiners or plasterers let loose in a building to carry out the design of an architect. What a mixture of pieces of workmanship would be the result! On the other hand, how can we expect an architect trained in the modern school to obtain more than a general and very superficial knowledge of the trades? The man who attempts to design and superintend all the details of workmanship which went to make the building is, at least, rather presumptuous, so that the question cuts both ways. But there is this difference: the designer's thought is not seen, the craftsman's work is visible. With all its imperfections it stands a lasting honor or discredit to the architect's design. In truth, the relation of architecture to workmanship must be understood better than it is if our buildings are to be worthy expressions of requirements. Harmonious coöperation is impossible until the architect and workman understand one another, both in regard to their knowledge of and treatment of material, and in that sense of expression which lies at the bottom of all art.

First they must both be educated in the right employment of material. While one regards a mass of stone or timber as ponderable substances that can be cut and shaped in any manner, and the other has learned its nature through the handling of tools, it is impossible that both can regard the material in the same manner. An agreement as to the mode of converting materials is absolutely necessary to a right understanding of design—it is the initiative of good workmanship. When an architect shows a stone detail worked one way, and the mason works it another, we cannot expect any satisfactory result. In many contracts the architect is willing to compromise with the builder, to allow him to vary in technical points, to use stock patterns. Sometimes he does so from a generous motive, the price being very low; but these concessions are often owing to a lack of practical experience on the part of the designer. Discretion may be the better part of valor.

Secondly, there must be coöperation in points of design. It is a great help if the mason or joiner knows a little of "art"—we mean as an education, something of style; if he does not, he cannot properly interpret a drawing. No properly trained mason would substitute a Gothic member for a Classic moulding; nor would it be possible for a joiner who had been taught in an elementary school of design, who had drawn mouldings, to select a machine-run "ovolo" or "cyma recta," for a moulding supplied by the architect. There is much to be said in favor of the French and Continental course, in which the architect engages his own craftsmen, who

tender at the schedule of prices adopted by the civic authorities, and who, as a consequence, are in touch with the architect's style and individuality.

When our technical schools shall have taught the various tradesmen engaged in building the elementary principles of good art, and have exercised their capabilities of design, we may expect a more perfect rendering of the architect's ideas. If he wants his design carried out well and as he intended it should be, he has to obtain the assistance of men who have either a special aptitude for their work or have made the trade their own. The provision of amounts for particular crafts in the contract is the only way now open to him, and the aid afforded by underletting portions of the work. By these means, at least, he has some control over the work, and he is more sure of obtaining a sympathetic interpretation of his ideas.—The Building News.

Notes in New York.*

THE impression of New York which may be regarded as that which is popular in England is that it is an up-to-date business town with a number of very high buildings. The Englishman who has not seen it, and many who have, are not likely to have endeavored to formulate the idea of the characteristics of what may be probably considered as the most remarkable city in the world. For there is no other town so full of vitality, which expresses so plainly the characteristics of the people who live in it, which reflects their nature so vividly. It represents energy, growth, youth, and a successful endeavor to unite utility and beauty. Yet it is full of contrasts; it has probably the most complete system of street communication in the world, while in some places it can show roadways which in badness of construction and in filth would not be tolerated by the most retrograde of local bodies in England. Its dwelling-houses are models of comfort and quiet, but the nervous system of its inmates is racked by street noises. Its hotels are palaces, the visitors in which are distracted by an overhead railway, which has made hundreds of rooms uninhabitable, and cabs being scarce they have to seek a seat in a street tramcar, if they wish to go down town. In such a city there is a natural tendency for those who are accustomed to European cities to find fault: the Englishman, who expects to have a hansom always ready to receive him in London, dwells upon some small discomfort; often neither the inhabitant of the Old or the New World is inclined to do their different countries justice.

It is, of course, the enormous masses of buildings, towering into the sky, which have already made Broadway more like a cañon in the Rockies than a street, which are the most obvious outward characteristic of New York. They are out of proportion to the width of the street, but they are at once a bold and a successful endeavor to solve the difficulty of space. There is no European community which would, to use a popular expression, have taken the bull by the horns in this way. New York, confined on Manhattan Island, pressed in by the Hudson and East rivers, has many times multiplied its area by the simple expedient of going upwards instead of outwards. It is obvious that, whether we like it or not, the cities of the Old World—more especially those of England—will have, in perhaps a somewhat modified form, to make use of this kind of building, though the wholesale way in which it is being carried out in New York would never have been possible in an Old World city. It is a building policy which is not being carried out in any half-hearted or spasmodic manner; gradually, but quickly, New York is, especially in the business portions, being converted into a city of towers.

The effect will presently be stupendous. There will be no other city like it in the world. It is all very well for passers-by to say that buildings of such a size are monstrosities, but seeing that utility is the first object of every building, it has to be admitted that the people of New York have by their system of building policy obtained not only space, but actually buildings in comfort and convenience up to the highest standard. A system of elevators constantly at work entirely minimizes the height, and thus movement, whether among offices or hotels, is easier and less fatiguing than in many a city covered by smaller buildings.

In the New Empire buildings, about twenty stories high, for example, at the lower end of Broadway, there is a complete series of elevators ready, some express and some ordinary, the express not stopping until they reach the eleventh floor. To these must be added the advantages of a telephonic system so much in use all over the United States that communication between different points in a city is rendered as easy as between two persons in the same room. This fact necessarily prevents the amount of movement which occurs in business offices in England. If a man can transact business from his desk it is unnecessary to move from his chair. Messengers are not required. Thus, whilst movement is diminished by the use of the telephone, it is made easy, when necessary, by the system of elevators.

Eager, however, as New York is to make the most of space, in no city is a stronger desire shown to erect buildings which shall be pleasing to look upon. This is more apparent in such buildings as hotels or private houses than in the blocks of offices, but it is a noticeable characteristic of the building progress of New York. This is not surprising: the educated American sets a higher value on art than does the average Englishman, or, indeed, a citizen of any other country except France. In temperament also he has more of the feeling for art than has the less nervously organized Englishman. It is chiefly in buildings that this feeling and desire can at present be best expressed. Any such expression must often be ineffective. But there can be no doubt that it is beyond the Atlantic that we shall find the finest buildings of the future. Energy, wealth, and a desire to produce structures which shall be at once useful and beautiful—large spaces, so far as cities outside New York are concerned—all these things make towards the creation of finer architectural works than can be erected in an older country. Architectural individuality in New York is, moreover, given a very large field, a scope which is noticeable especially in regard to private houses. This freedom, though it necessarily from time to time must result in eccentricity, yet affords opportunity for much larger artistic effect than can be obtained in the more formal and systematic streets of English and Continental towns. Sometimes, also, the contrast between the opposing styles of houses which are side by side, the conflict between different materials—a red brick, for instance, side by side with yellow stone—does not tend to general harmony of effect. On the other hand, the obvious and often successful endeavor to create an individual house, pleasing to look upon—not one portion, as in England, of a monotonous street—is remarkable. There is no part of New York where these features of the city are more noticeable than in the Riverside Park overlooking the broad waters of the Hudson, one of the finest residential sites which can be found on either side of the Atlantic. Each house that is placed on this position differs from its neighbor; each owner has endeavored to make his house worthy of the site. The styles of every part of the Old World have been called on to contribute—Flemish towers, Renaissance ornaments, the sober red brick and white facings of the English country house. And whether the result be pleasing or not to an observer, it is impossible that he should fail to be struck with the strenuous effort, not made here and there, but generally, to erect houses which shall be at once comfortable internally and pleasing externally.

New York is thus at the present moment probably the most interesting and instructive modern architectural study: each year sees some new building finished or begun. On the high ground to the north and east of Riverside Park is the new home of the Columbia University, a series of detached buildings, sober and academic in character. The disused Croton reservoir in the upper part of Fifth Avenue is about to give place to a building of quite a different kind. There are now three important libraries in New York: the Mercantile, which was completed in 1891, and occupies the site of the old Opera House; the Astor Library, as its name implies, was founded by one of the Astor family—John Jacob Astor—and the Lenox Library, which was built and endowed by Mr. James Lenox, and the erection of which was completed in 1877. These three libraries, each of no mean value, are to be concentrated in a single building, which will occupy the site referred to, and will undoubtedly be one of the most important institutions of the kind in existence. The proposed change exemplifies the characteristics to which allusion has been made. Each of the three libraries is a modern building, but there is no hesitation in reoganizing them and erecting for them a building of the first importance. This project, as well as the completion, a few years ago, of the fine public library at Boston, is noteworthy from another point of view—there is in the United States no begrudging of money for buildings of what may be called a non-utilitarian character. It is one favorable trait in the American people that their desire to have complete buildings is so catholic.

These are but examples of the constant movement and change which is transforming New York. The spirit which builds a Western town of wooden shanties on a spot which but very lately before was a pine forest, is equally at work here under different and more interesting conditions. No people are more sensitive to the opinion of the world than are Americans, and it is in the improvement of New York that this desire to create something which will add to the credit of their country is very clearly shown. The effect of European travel is also obvious: the Englishman will visit any number of Flemish or Italian buildings and return unmoved to vote against the local representatives in his District Council who would spend money on dignified public offices. The American recrosses the sea with the intention, so far as possible, of transferring the great buildings of Europe to his own soil. The capitol at Albany, completed but a few years ago, is, perhaps, the most striking instance of this character. But hotel proprietors even advert to the architectural style of their house as an attraction. No house in New York stands higher than the Holland House, on Fifth Avenue. The first sentence of the advertisement of it which is distributed widely is not in regard to its cuisine or its charges, but refers to its appearance, "without exception, the imposing façade of Holland House is the finest piece of architectural doorwork in New York." Internally various rooms and details are copies of those at Holland House in London, and the back of the hotel book has an excellent reproduction of the historical mansion at Kensington. Taken by itself, a thing of this sort would mean nothing, but it is one of a number of facts all tending to show the value which is set on architectural beauty, and the honest and general desire which is noticeable to make the buildings of the country really worthy of a great nation. No characteristic could be more hopeful for the future of the country, or a greater sign of the vitality and the educated energy so conspicuous in those parts of the Republic where the climate is suitable to men of European origin.—The Builder.

* The following article is valuable as giving an English view of our American city architecture, and while some of the views are not new, they are interesting.

Tests of Nails.

RECENTLY some very complete investigations have been made in the laboratory of Sibley College, Cornell University, to determine, first, the relative merits of cut and wire nails—a question involving the due consideration of the surface of the two types, as well as the proper shape, point, etc.; secondly, the best relation between the thickness of the board nailed and the length of the nail; thirdly, the relative holding power in different kinds of wood; and fourthly, the approximate stress nails may be expected to stand both in direct tension and when subjected to shearing stress, the relative force required for driving in and drawing out, etc.

Any absolute statement as to the holding power of nails would be of little or no practical value, since a slight alteration in the governing conditions would very materially affect the result. Only comparative results are therefore given, but these are of interest, more especially as they suggest a possibility of effecting a marked improvement in the cut nail.

It is to be noted that when a pointed wire nail is driven into a piece of timber, it forces the fibres of the wood apart, the elasticity of the fibres keeping them tightly pressed against the sides of the nail. On the other hand, when a square or cut nail, not pointed, enters the wood, the edges on the end sheer off, and there is little or no wedging across the grain. As the nail penetrates, the two sides which are perpendicular to the grain are wedged and press back these fibres still more, and when the nails are being withdrawn these fibres act as barbs, and resist its removal.

To show that the greater part of the holding power of these nails was due to this action, a nail was driven in between two holes, so that only the ends of the fibre came in contact with its surface. Then, by comparing the pull necessary to withdraw this nail with one driven in the ordinary way, it was possible to estimate the value of this effect. In one experiment the nail driven between holes required a withdrawal pull of 590 pounds, while an exactly similar nail driven in the solid wood required 635 pounds to remove it, or only a gain of 45 pounds, or less than 8 per cent. more. Evidently, therefore, by pointing an ordinary cut nail, its holding power should be very materially increased, since its grip would then be due to a combination of both the cut and wire nail effects.

Comparing the value of cut to wire nails, as regards their resistance to a straight pull, it was found that for 4-inch nails the advantage was on the side of the cut nail in the proportion of five to four; for 2½-inch nails, the advantage was much greater, the ratio being as nine to five.

As nails are more often subjected to shearing strain, several experiments were made to decide the relative value of the two types of nail under this condition. Two pieces of wood were nailed flat together and placed in a testing machine in such a manner as to cause one piece of wood to slide over the surface of the other, thus subjecting the nails to a direct shearing stress. As may be readily supposed, the nature of the timber used materially affected the results. When Georgia pine was used, the wire nail had a superiority of about six per cent. With white pine, hemlock, and oak, however, the wire nail showed an inferiority of twenty-two per cent., eleven per cent., and five per cent., respectively. These comparisons were made on the basis of equal areas of nail, and compared by the fairer standard weight, the average of the cut nail is still greater.

To determine the effect of the surface of the nail on its holding power, tests were made of plain, barbed, and "blued" wire nails. The barbed nail was found to offer a somewhat greater resistance to withdrawal than the plain, smooth nail; but the "blued" nail was much superior to either. Further, it was found that in cut nails, barbs which are sharp and angular diminish the holding power, and that the resistance to driving and withdrawing varies in about the same ratio, generally at about six to five.

The experiments showed very clearly that the shape of the driving end of the nail is important. The holding power of a pointed wire nail was found in one case to be 122 per cent. greater than an otherwise similar but blunt

nail. Even slightly beveling the edges was found to increase the holding power about eighty per cent.

So far as the effect of time on the holding power could be tested, it was found that the grip diminishes as the nail stands, though after being wet the rusting of the nail causes it to hold better. Roughly, it was found that the nail holds about one and a half times as much when driven in the side of timber as when driven in the end.

Summing up the results of the experiments, they may be said to show that (1) cut nails are superior to wire nails in all positions; (2) the main advantage of the wire nail is due to its possessing a sharp point; (3) if cut nails were pointed, they would be thirty per cent. more efficient in direct tension; (4) wire nails without points have but one-half their ordinary holding power; (5) the surface of the nail should be slightly rough, but not barbed—barbed decreases the efficiency of cut nails about thirty-two per cent.; (6) nails should be wedge-shaped in both directions when there are especial dangers of splitting; (7) the length of nails to be used in tension should be about three times the thickness of the thinnest piece nailed; when used in shear about twice this thickness is sufficient; (8) the relative holding power in different woods is as follows: White pine, 1; yellow pine, 1.5; white oak, 3; chestnut, 1.6; beech, 3.2; sycamore, 2; elm, 2, and laurel, 2.8; (9) nails usually hold about fifty per cent. more when driven perpendicular to the grain than when driven along it; (10) nails are always strongest when driven perpendicular to the surface of the timber; (11) when subjected to shock, nails will hold less than one-twelfth the load they will stand when weight is applied gradually.—The National Builder.

Round Towers of Ireland.*

IN selecting the subject of the present paper I have been actuated by a desire to reopen for controversy a subject which appears to have lain practically dormant for at least some time past. The subject of the "Round Towers of Ireland" is one that would fill a fair-sized volume. It presents dimensions and outlines far too wide for the scope of a single paper. To trace clearly, even in outline, to compress and at the same time try to elucidate the fads and the follies of many of the absurd theories put forward would be simply impossible. However, I shall try, even imperfectly, to describe the buildings as I found them, and compare them with the theories of learned gentlemen who have devoted some time and study to the question, so far as these theories, etc., are applicable to them. The question is one well worthy the attention of the learned antiquarian and the scholar. It seems to me a pity that any doubt should exist on the subject, and I fail to see a just reason for doubt, in face of the fact that the dates of the erection of some at least of the towers are recorded in the "Annals of the Four Masters"—a work admitted by historians of all shades of thought in the kingdom and in Europe to be the most respected, reliable and truthful record of events in Europe to-day. To say or assert that the round towers are the "conquerors of time" is to express a very great fallacy. At the present day we have about half the number standing of which history gives us a record, and these are in different stages of dilapidation and decay, and they also are bound to perish and pass away with the conquering hand of time. It is true that a fair number of the towers still lift their heads in sublime grandeur to-day, thanks to the fostering care of some private gentlemen, antiquarian societies, and, in later years, the Government of the country, who have with praiseworthy zeal at last come to the rescue of our ancient monuments. The period at which the towers were erected appears to be the real bone of contention, and it is to this I would particularly ask your special attention. The object for which they were designed and erected appears to me to be the only question requiring further elucidation than that which has obtained up to the present time.

In the early part of the present century the question of the origin and uses of the round towers received very considerable attention, and was very well handled by several parties holding diverse views on the subject. In a letter recently received from a very learned reverend friend and historical writer, he says: "From the rivers of ink, used in defending one or other of various opinions of learned men, I turned away with something approaching disgust; such a lot of rubbish, such a heap of nonsense as has been written on them." There can be no possible doubt entertained as to the correctness and truth of this statement. Tons of paper and barrels of ink have been wasted upon the subject by men, many of whom were very learned authors and painstaking historians, but who lacked an intimate knowledge of the Gaelic race and language and the rise and development of ancient Irish architecture, or the primitive architecture of European or Asiatic countries. It has, with these writers, generally been the case of one commenting upon another in successive stages, combating the views of their neighbors and predecessors while trying to advance their own notions on the subject, demolishing one house of cards to erect another on its ruins.

So distracting, absurd and confusing were the expressed opinions of every writer on this subject of Irish antiquities in the early part of the present century, that the Royal Irish Academy (one of the most distinguished and learned bodies of antiquaries in Europe) offered a gold medal and prize of £50 for the best essay on the "Origin and Uses of the Round Towers of Ireland." A clause in the conditions of the competition made it incumbent on competitors to make a careful survey of at least a large number of the then existing remains of the round towers, and at the same time to make a careful comparative analysis of the masonry of the towers, and the masonry of the ecclesiastical buildings always found in connection with or adjacent to the towers. It was then for the first time in the history of the controversy that the subject was taken in hand in a practical way by a practical and educated man, and one who, by the glorious record which he has left us in his writings, has proved to the world his fitness for the work which he undertook to do.

George Petrie, LL.D., R.H.A., V.P.R.I.A., it was, who for the first time in Irish history, cleared away the accumulated rubbish of ages with which time had surrounded the round towers. Under the influence of his pen and his brain the mists, the doubts and legendary romance that had up to that time enshrouded the round towers of Ireland were lifted and cleared away forever. The Royal Irish Academy, in 1833, after careful study and consideration, unanimously voted Dr. Petrie the gold medal and Prize of £50, which he richly merited.

Dr. Petrie having been engaged on the Ordnance Survey of Ireland, under Colonel Sir Thomas Larcom, enjoyed peculiar facilities for prosecuting his inquiries and research. Sir Thomas Larcom, R.E., Superintendent of the Ordnance Survey, gave him every possible facility, encouragement and assistance while engaged on the work, and in the elucidation of ancient Irish manuscript documents he has had the assistance of the two best Irish scholars of the century, John O'Donovan and Eugene O'Curry, also fellow-workers on the Ordnance Survey. In addition to the above-named advantages, Dr. Petrie had free access to and made close examination of the ancient Irish manuscripts and other kindred documents of historical interest, preserved in the British Museum, Trinity College, Dublin, the Royal Irish Academy, and the Arms Office, Dublin Castle, and everywhere else in the country where documents of the kind had been stored and preserved.

It is greatly to be deplored that the documentary treasures mentioned fall far short of the number of manuscripts which might have been preserved, and that because of the wanton and deliberate destruction of such documents by Government officials of bygone days. As regards the destruction of Irish manuscripts, I take the following quotation from Mr. Joseph Salmon's valuable essay on the round towers, published in Belfast, 1886: "The policy which the representatives of English rule in Ireland pursued towards the Welsh manuscripts, they enforced against the Irish, also visiting our native records with every species of hostility."

Dr. Rothe, Bishop of Ossory in James I.'s reign, testifies in his "Amacleta" (p. 342) that when the alien authorities became aware of a MS. history being in the hands of a private person it was immediately begged or bought, or threats were employed to obtain possession of it if other means failed, so that a man's life was endangered by resistance to their will. He names Sir George Carew, Governor of Munster and author of the famous work, "Pacata Hibernia," as guilty of notorious robberies and ravages thus committed upon our written records. The destruction which this man wrought in a single province among our ancient memorials Sir Henry Sydney and other deputies extended to the entire kingdom, their conduct encouraging the belief that it formed part of their office to subvert every trace of antiquity in the country (p. 343). Dr. Lynch, who flourished under the three Charleses, avers ("Cambrensis Eversus," Vol. I., p. 337) that wherever Elizabeth's troops were quartered they rifled the houses of friends and foes indiscriminately, carrying off all Irish MSS. which they could possibly lay hold of. A dearth of Irish manuscripts was thus entailed to succeeding ages.

An excellent Irish scholar, Dr. W. K. O'Sullivan, in his introductory volume to Eugene O'Curry's lectures, says: "During the first part of the eighteenth century, the possession of an Irish book made the owner a suspected person, and was often the cause of his ruin. In some parts of the country the tradition of the danger incurred by having Irish MSS. lived down to within my own memory, and I have seen Irish MSS. which have been buried until the writing had almost faded and margin rotted away, to avoid the danger which their discovery would entail at the visit of the local yeomanry." Numberless cases of a similar character could be given, and were it necessary for purposes of this inquiry, the most reliable English, Welsh, Scotch, German and French historians might be quoted as deploring the loss which the history of Mediæval civilization has suffered at the hands of official vandals in Ireland.

To those causes must be attributed the mystery and uncertainty which has hung round the tower-building period in Ireland. But in the early part of the present century, with the partial recognition of civil and religious liberty, a happier state of things came into existence. Such of the old Irish documents as escaped the vandalism of bygone days were unearthed with a new enthusiasm, and the contents critically investigated and translated by O'Donovan, O'Curry, Petrie and others of lesser note. Many beliefs entertained under circumstances of less enlightenment were dissipated as devoid of foundation.

Famous among the ancient remains whose history had been enshrouded in darkness (a darkness, it might be said, rendered thicker by each succeeding hand which had attempted to dispel it) were the round towers, and to divest them of their robe of obscurity may rank among the greatest achievements of modern archæological science. Mr. Gladstone's Government in 1869 added a clause to the Church Disestablishment Bill, setting aside a small sum of church surplus funds, to be applied in preserving Irish national monuments of architectural and historical interest, and about twenty-five monuments were scheduled in connection with this Act. Sir Thomas H. Deane (then Mr. Deane, R.H.A., architect) was appointed by the Treasury Superintendent of the National Monuments, in conjunction with the Commissioners of Public Works in Ireland, who got control of the funds. Several other monuments have in subsequent years been added to the original list, embracing nearly all the ancient buildings in the country worth preserving, including the principal round towers.—The Architect.

* A paper read by Mr. Anthony Scott, M.S.A., at the meeting of the Society of Architects on April 27, 1899.

Protection from Lightning.

A MONOGRAPH on "Lightning and the Electricity of the Air," recently issued by the United States Weather Bureau, affords some interesting information upon the question of protecting buildings from lightning. To what extent is it practicable to protect a building, and to what extent is it profitable to attempt such protection when it is practicable? Before answering these questions it is necessary to convey a clear idea of the nature of lightning flash. The old idea is that the flash, like the moderate current of electricity with which we are familiar, follows the line of least resistance, and can be diverted by a conductor of a certain size. In this view, the lightning-rod is like a channel made to convey a flow of water, and a small channel will empty a large reservoir if given time enough. But the Weather Bureau likens the lightning-flash rather to an avalanche, a landslide down the side of a mountain or the breaking of a dam—the whole force is exerted in one instant and there is no after-current. The flashes, however, vary greatly in volume, some of them being mild affairs. And it is always true that a well-constructed and well-arranged lightning-rod will, if given time, silently convey away a vast deal of electricity, thus lessening greatly, if not preventing, the ultimate flash. It is on this account that lightning strokes are comparatively infrequent in large cities, where lofty spires and roofs drain over-charged clouds before the stratum of air between the cloud and the houses is strained to the breaking-point. It follows from the avalanche-like nature of lightning that absolute protection of a building is impracticable unless the building itself—as being a steel structure—is itself a good conductor. But a very large measure of protection is within our reach. A chimney or church spire well provided with rods is almost perfectly protected, and rods distributed to exposed points will reduce the risks of a wide roof area as much as 75 per cent. There is no definite "area of protection." The old rule was that a rod protects a radius equal to its height, and the rule may stand for want of a better, but as a matter of fact it holds good only with electrical discharges of moderate volume. Whether it pays in a particular case to invest money in lightning-rods depends upon circumstances. Sometimes the risk is so slight as to be neglected. The cost of the rods may be such as to render fire-insurance preferable. But where the risk of being struck is very great—as in the case of church spires and high brick chimneys—the value of the property threatened renders the lightning-rod a necessity. It may be said to be necessary also where the risk is less, as, for example, for buildings that contain a great number of persons—large summer hotels, large school buildings, asylums, and expensive public buildings. A very costly building cannot be wisely subjected to a slight risk from lightning if protection can be obtained. The risk on farm buildings is greater than on any other class of buildings, but where their value is small it is usually preferable to rely on insurance for protection. As to the nature of the rod, it is stated that either iron or copper may be used, and iron is as good as copper, provided the section of the iron rod be enough larger to compensate for its inferior conductivity. A rod of iron weighing 35 oz. per foot is held to be equivalent to a copper rod weighing 6 oz. per foot. A flat conductor is recommended, on the ground that surface counts for more than section. Glass insulators are useless. The rod may be fastened directly to the building to be protected. The matter of greatest importance is the condition of the two extremities of the rod—a matter often neglected with disastrous results. A rod is perfectly useless—in fact, a source of danger—if its lower end is not carried down into the ground far enough to reach wet earth. It should be connected with a good-sized piece of

iron buried at the lowest depth reached by the rod. The top of the rod should be pointed and plated for protection from rust. "It is ludicrous," says the Engineering News, "to run a rod down the side of a building and neglect the grounding, as is so often done, just as if the lightning were a dangerous bug which could be safely disposed of by being induced to crawl down to the bottom of the rod, and which might then be left to jump off as and where he pleased. The correct way of looking at it is to consider the rod as a channel down a mountain side to guide a possible avalanche. The larger the channel (or the less the total electrical resistance of the whole rod) the more surely will the avalanche be confined and led through the channel provided for it."—Boston Transcript.

A CHEAP ALL-STEEL SASH PULLEY.

The pulley made by the Grand Rapids Sash Pulley Company, of Grand Rapids, Mich., is composed of a shell made of one piece of sheet steel formed under great pressure into proper shape. The corrugations make a very rigid shell, which, being solid at both ends, cannot collapse and bind the wheel. The face-plates cover the outline of either mortise.

CORRUGATED ALL-STEEL SASH PULLEY.

The wheel is made of two sheet steel disks, interlaced at four points in such a manner that it cannot split under the heaviest strain. Both disks are exactly alike, making a wheel that runs perfectly true and noiselessly. The axle is turned from solid bar steel, with a shoulder to hold the sides in exact position, and is firmly riveted to the shell on each end. No screws or nails are required to insert the pulley.

Colonial Brickwork.

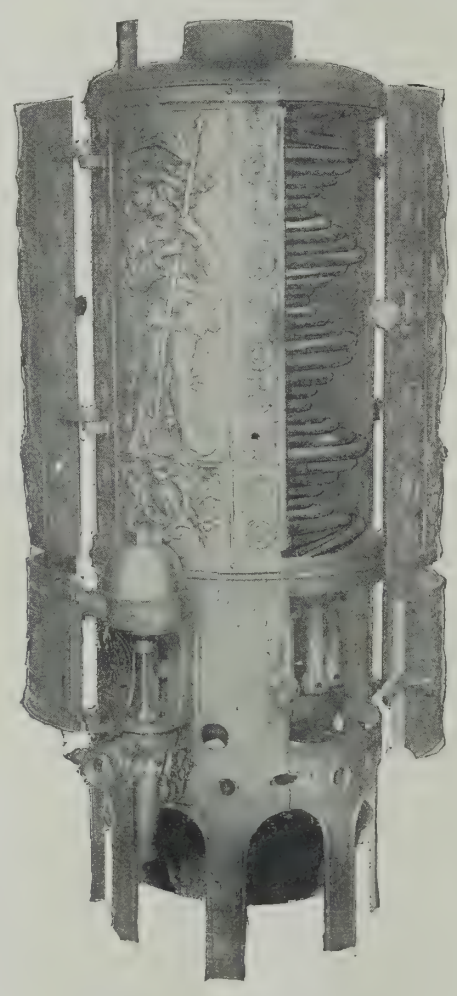
The whole eastern seaboard of this country is very richly endowed with deposits of clay suitable for the manufacture of brick and terra-cotta, and yet, although the first settlers in New England came directly from Holland, and were accustomed to brick in all its various forms, they were very slow to appreciate the possibilities of nature, and nearly all of the bricks used in the earlier colonial structures were imported from abroad. We had occasion some time since to visit Plymouth, and were much interested in seeing on Burial Hill the remains of the old fort which was built about 1625, and constructed of bricks imported from England. The structure itself has entirely disappeared from above ground, but every little while in disturbing the soil, fragments of old brick are found, evidently in very fair condition, though not of remarkably hard variety. In the Pilgrim Hall at Plymouth there are preserved some old bricks and tiles which came from Marshfield, which were imported early in the seventeenth century. It was not until some considerable time after the freestone and granite quarries were opened that our early settlers began to appreciate that a more readily obtainable material was close at hand.

If we were called upon to formulate any reason for the undenied excellence of much of the colonial architecture which we find in this country, we should be inclined to ascribe this excellence in very large part to the fact that in those days such things as contracts, contract work, and architects were practically unknown. But this statement must not be understood as implying that a good architect is a detriment to a building, for in only one sense was the absence of the architect an advantage to the old work. All of us who have been through the mill appreciate how, in building almost any structure, we are prone to attempt to carry out a preconceived contract. If we have once laid it out on paper and made up our minds on paper that it ought to be about so and so, we are very apt to build it so, and if it doesn't come out quite as we expect we let it alone and try to do better next time; while on the part of the owner the feeling is so strong that changes involve extra expense that even if a change is really desirable the mere fact that it is presented by an architect or a contractor arouses the suspicion of the sometimes short-sighted owner.

In the colonial days things were done differently. We imagine the plans that existed in those days were few and far between, and the more probable procedure was for the village carpenter to start to work and frame his house without a very definite preconceived plan, except that in a general way he was to follow the lines laid down in some one of the few but generally safe architectural books at his command. After the walls were up the interior was changed about or worked up from time to time so as to give just the effect desired, and probably the exterior was handled in much the same way, so that in these buildings we find details which very generally seem to belong in place on the exterior, and within are found the charming nooks, chimney corners, or picturesque angles which are so distinctive of the best colonial work. It is not humanly possible for any architect to entirely foresee the full effect of his designs, and so long as we are tied to a contract, even though the opposition to changes may be slight, it is apt to be a hindrance to our molding the design so as to fit the necessities in the best manner. We believe that a return to the possibly more primitive manners of our forefathers would result in immeasurable good to our architecture of to-day, not only in its domestic manifestations, but also in its public buildings, where the limitations of preparatory studies as compared with final effects are even more marked. The old work which was done in this haphazard way was by no means always good, but among it there is considerable which our modern designers find very profitable to study. There is a vast deal of excellent old brickwork scattered along the Atlantic coast from Maine to Florida, which we think can be studied to most decided advantage.—The Brickbuilder.

AN IMPROVED ECONOMICAL WATER-HEATER FOR THE HOUSE.

Hot water apparatus has become one of the necessities in the homes of up-to-date people, and there are very few houses that are not supplied with hot and cold water for bath, kitchen, and laundry. Of the many forms of water-heater which are at present in use, the Gabel Automatic Instantaneous Water-Heater deserves particular mention by reason of the absolute automaticity of its operation. It is made by the Gabel Manufacturing Company, of 105 Market Street, Pittsburgh, Pa. It is not an experiment, but represents the perfect combination of theory and practice, by which a practical and economical heater is obtained. It is



THE GABEL WATER-HEATER.

constructed so as to give the greatest amount of hot water with the least possible consumption of gas. A most striking feature of the Gabel water-heater is its economy; for gas is consumed only during the time in which the hot water is running, and heat is applied exactly where it is required. With natural gas at 25 cents per thousand, it costs but one-third of a cent to heat water for a bath. The Gabel heater is generally placed in the cellar, or any convenient place, and connected with the hot-water pipes throughout the house. It has no storage capacity and heats the water instantly, as it passes through the copper coil. The opening of any hot-water faucet in the building turns on the gas; the closing of the faucet turns off the gas any hour of the day or night.

The Evolution of the Bedroom and Bedstead.

Perhaps the last article which the late Lawson Tait contributed to medical literature was "Hygiene of the Bedroom and Bedstead," which appeared in several British and American journals. It treats of the evolution of the bedroom and of that now necessary article of furniture, the bedstead, in Great Britain. It tells us, says the Medical Record, that in the days of the cave dwellers and through the various stages of savagery and nomadic life, dwelling space was used for all purposes in common. It was not until the wandering hunter had, so to speak, settled down that he saw the advantage of putting aside a portion of his dwelling for sleeping purposes. The Briton in the time of the Norman era had a very fair notion of what constitutes a comfortable bedroom and bedstead, although his castle might be outwardly grim and forbidding. The walls of the castle were thick and solid, thus securing a fair uniformity of temperature, while the downdrafts of cold air were modified by hangings of tapestry. For their bedsteads there was no need of hangings. The Saxon farmer, however, had to live under very different conditions. His house was of wood, and carpentry at that time was at very low ebb, so that the doors and windows were ill-fitting, and drafts were the rule. This resulted in the evolution of that abomination of abominations, the four-poster bed; and, as Dr. Tait preferred to put it, "A small apartment was constructed inside the bedroom in the shape of a four-poster hung round with curtains, into which a whole family must have crowded, possibly with the addition of occasional visitors." The conservative Britisher clung to his time-honored four-poster until the fifties, when occurred the dawn of domestic sanitation. The first step in the right direction was the introduction of the metallic bedstead.

A brick chimney, 160 feet high and 8½ feet square at the base, and 4½ feet diameter at the top, has been overthrown in St. Louis by the use of hydraulic jacks, says The Engineer. The chimney was first undermined on one side, and three 10-ton hydraulic jacks were placed in position under the side. A hawser was then fastened about the chimney, 60 feet from the ground, and ropes led from this hawser to crabs placed at a distance of about 100 feet from the chimney. With eight men at each crab and men at the hydraulic jacks, the chimney was slightly lifted and pulled at the same time; the men at the jacks left their posts at the first warning crack, but those at the crabs continued their work until the chimney fell.

Damp-Resisting Paint.

The damp resisting paint made by Toch Brothers, 468–472 Broadway, New York city, is not an asphaltum or coal-tar compound, but a combination of elastic gums, which resist the action of moisture. The paint can be spread very easily on any surface. If the coating be even so that there are no blank spots through which water can trickle, no moisture will ever find its way to the surface.

The paint saves the cost of furring outside walls. Stone, wood, or ironwork coated with the paint can be plastered within a day. The paint will not peel, blister, crack, or chalk. To any architect or engineer who desires to make a practical test, the firm will be pleased to send a liberal sample gratis.

The excavation of the Roman tessellated floor at Dorchester, England, is practically finished, and the discovery is regarded as highly important. The design of the pavement is very elaborate, and, though considerable damage has been caused by the cutting of a drain through it before the discovery was made, a large proportion of the pavement is singularly well preserved. Experts consider that the floor is that of a tablinum, or other principal room, and that the work was done late in the Roman era.

THE FAULSTICH CHIMNEY TOP.

In order to protect a chimney against spreading, and bricks from falling out, various appliances have been devised, among which we mention the Faulstich chimney top, manufactured by Faulstich & Daab, of Belleville, Ill. The chimney top is made of stove cast iron, and is composed of an inclined guttered ledge, from the outer end of which a rim extends upwardly and downwardly. Spouts communicate with the ledge and project out beyond the outer sides of the rim. The spouts on the corners and the upwardly-projecting rim on the sides will prevent the water which may accumulate on the chimney from running down the walls, protecting the mortar joints from damage by the rain, and also preventing the chimney from being stained by the soot.

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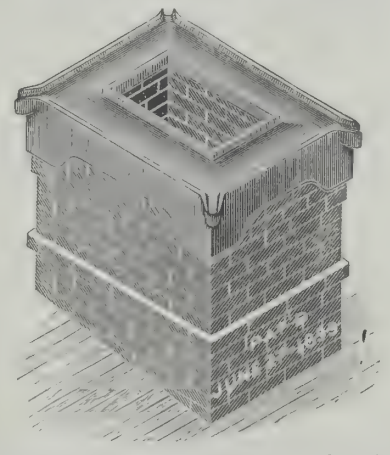

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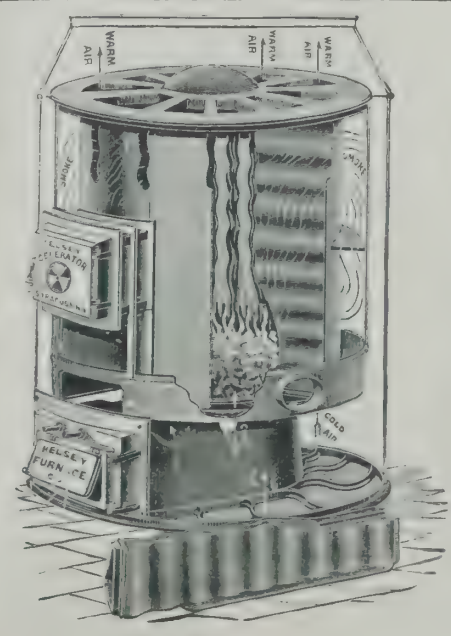

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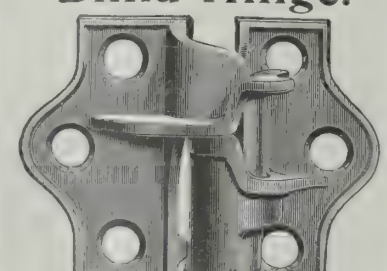

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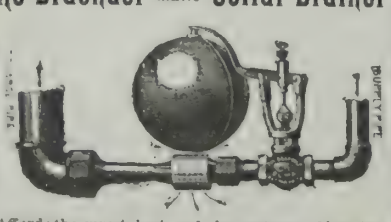

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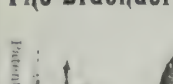

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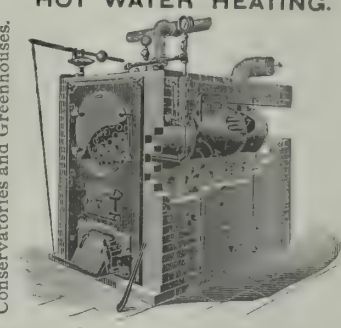

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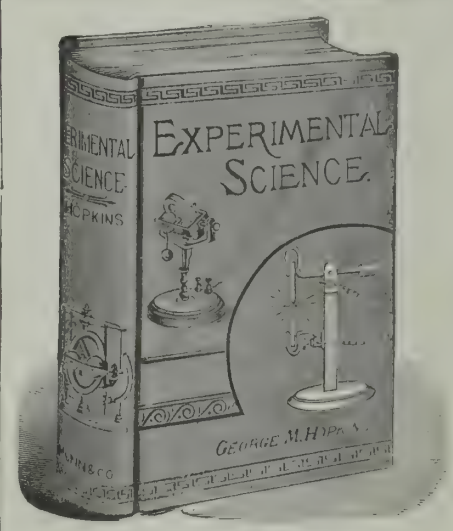

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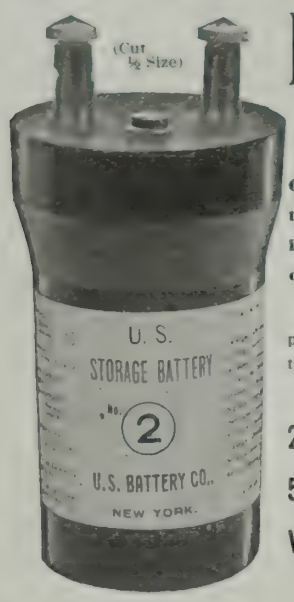

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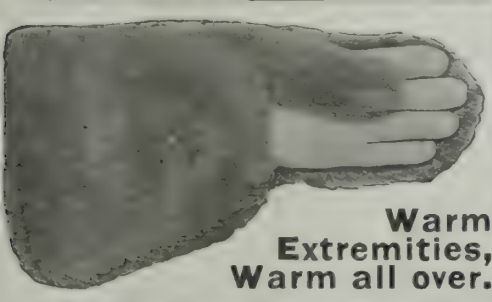

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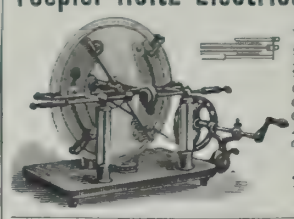

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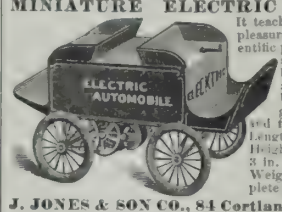

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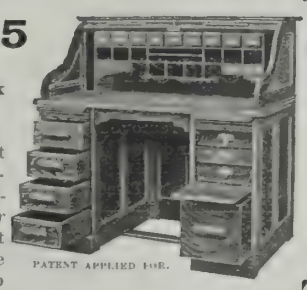

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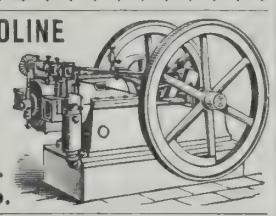

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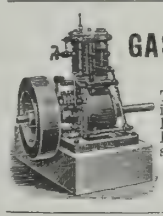

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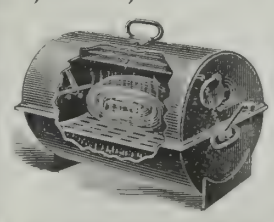

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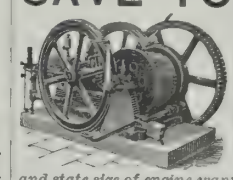

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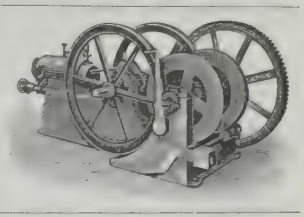

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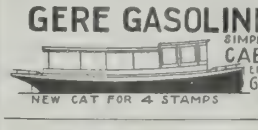

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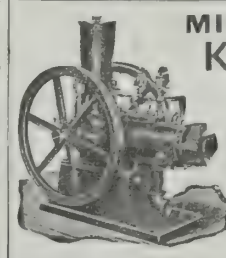

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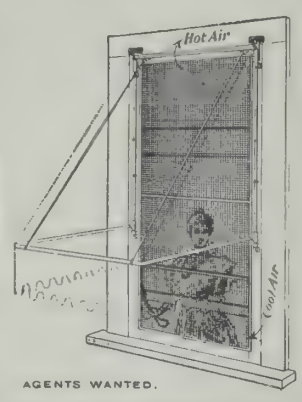

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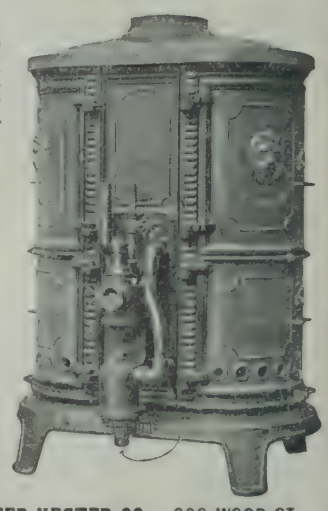

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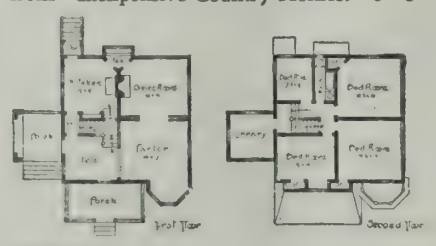

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THE ARCHITECTURAL LEAGUE.

THE fifteenth annual exhibition of the Architectural League of New York opened on February 10. Since the exhibition was first held in 1885, the number of exhibits has grown larger and the quality of them has steadily improved every year, until now there are no less than 1,277 distinct objects, consisting of plans, elevations, and rendered drawings of architects' designs, models of buildings, groups and decorative drawings for stained glass and mural work, mural panels, studies, sketches, bronzes, sculpture, ceramics, and various miscellaneous exhibits which exemplify the art of decoration. The exhibition this year is, perhaps, not as interesting to the general public as some of those that have preceded it, but at the same time it will repay repeated visits by the student. The desire to attract the general public and interest them in architecture, painting and sculpture and the allied arts, has, perhaps, been rendered a little too popular by the admission of certain exhibits that do not appear to be germane to the work of the League, and a few of the exhibits are so bad that they should not have been admitted by any jury. The arrangement of the various drawings, etc., is most agreeable, and the ensemble is most striking. In the first gallery there is the decorative exhibit, and naturally the most important building which has been decorated in the last two years—the Appellate Court building—is represented by a number of drawings and cartoons by E. H. Blashfield, Kenyon Cox, Joseph Lauber, and there are also some interesting photographs and studies for W. B. Van Ingen's decorative panels in the offices of the Edison Illuminating Company. Mr. Van Ingen has done a remarkable work in these panels, taking, as he has, one of the most prosaic subjects connected with our modern civilization and idealizing it to a remarkable degree. The Sage Memorial, at Cornell University, is admirably illustrated by a large cartoon, designed by C. R. Lamb. Among the loans is a sketch for a decorative panel for the Grolier Club, "In the House of Aldus," by Flameng, which is admirable. In a smaller gallery there are the usual book covers, burnt wood, burnt leather, designs for tapestry, etc. There appears to be nothing of special importance, but the designs are almost all uniformly good. The central gallery is devoted to sculpture, and the showing is excellent, and reflects great credit upon Augustus Lukeman, who had charge of the arrangement. Naturally, the naval arch has furnished a number of studies—they are, of course, on a small scale—and these figures show what care the sculptors used even for this rather ephemeral production. The vases and other ceramic productions from the Grueby Faience Company and Charles Volkmar, are very fine indeed. In the east gallery there is a number of pieces of architectural wrought-iron work, etc., and this section shows a notable increase over last year, both in quantity and quality. Some of the animal tiles and scenes from Kipling's "Jungle Book" are excellent. We also note a model of a large triangular inkstand, by E. R. Smith,

The large Vanderbilt gallery is, as usual, devoted to architectural designs, and this is, of course the most important part of the exhibition. The best things, however, have to be looked for in the smaller drawings, but as has already been stated, the student will be amply repaid for his pains. There is a lack of any central exhibit around which the others can be grouped. The nearest approach to this are some of the drawings for the Phœbe Hearst competition for the University of California. The splendid drawings of M. Bénard show what an opportunity was offered for the architect to exert his skill. The complaint is too often made against the French architects, and especially the Beaux-Arts' men, that they are constantly making drawings for vast, impractical schemes, such as railroad stations, national monuments, and other things of the same order. The drawings of M. Bénard and some of his countrymen show that when a really important work of great magnitude is contemplated they are able to rise to the occasion and produce a worthy design, which is at once dignified and convenient. The drawings of the successful competitor already referred to give promise of a superb ensemble. There is a number of other designs exhibited in other parts of the building. The Custom House competition is also well represented, including the accepted designs of Cass Gilbert. An examination of the designs makes one glad that some of them were rejected, and Mr. Gilbert's design is at least dignified and earns our respect. The floor plan is admirable, and in a custom house that is a most important feature.

There are also the competitive designs for the Department of Justice building, Yale College Memorial building, and the New York Stock Exchange. There is an excellent plaster model of the exterior of the house of Andrew Carnegie, and a cardboard model of a house at Morristown, N. J. The number of architectural designs is very large indeed, amounting to over 457, so that it is impossible even to mention some of the best work. On the whole, the architectural section may be regarded as showing a satisfactory progress without any particular novelties. The catalogue is, as usual, a handsome volume, filled with fine reproductions of architects' drawings, works in sculpture and painting and glass.

THE TEN MOST BEAUTIFUL BUILDINGS IN THE UNITED STATES.

SOME years ago The American Architect invited its readers to vote on the question of the ten most beautiful buildings in the United States, and the results were very interesting. First came Trinity Church, Boston, Gambrill & Richardson, architects; then the United States Capitol, Washington, D. C., Messrs. Hallett, Thornton, Hadfield, Hoban, Latrobe, Bulfinch, Walter and Clark, architects; then followed the house of William K. Vanderbilt, Esq., New York city, Richard M. Hunt, architect; then Trinity Church, New York city, Richard Upjohn, architect. This was in turn followed by the Jefferson Market Court House, New York city, F. C. Withers, architect; then followed the State Capitol, Hartford, Conn., Richard M. Upjohn, architect; next the City Hall, Albany, N. Y., H. H. Richardson, architect; Sever Hall, Cambridge, Mass., H. H. Richardson, architect; the State Capitol, Albany, N. Y., H. H. Richardson, architect, and the Town Hall, North Easton, Mass., H. H. Richardson, architect.

A comparison of this fourteen-year-old list with that just made up by the suffrages of the readers of the "Brochure Series" is interesting, and suggests some significant architectural acquisitions. The general trend of architecture since that time and the rise and wane of architectural fashions in buildings included in the old classification show that it bids fair to stand the test of time, etc. The results are very interesting, and are discussed in the last number of the Brochure Series, by Professor Hamlin, Professor of Architecture at Cornell University. Since there is no such thing as an absolute objective standard of comparison for all works of a given class, the personal equation and the time equation must always enter largely into critical estimates by individuals or groups of individuals. Consequently the result of a vote on the "Ten Most Beautiful Buildings in the United States" can only be a consensus reached by the fusing together and averaging of a number of widely diverse estimates. The National Capitol and Trinity Church, Boston, are the only buildings common to both lists, and the progress of our National architecture in fourteen years will be seen by the fact that six of the buildings on the Brochure list were in 1885 either incomplete or not yet begun. In 1885 Mr. Richardson was the one bright particular star in the architectural horizon of the United States, and half of the list of 1885 was his work. Only one of these buildings remains on the new list, Trinity Church in Boston. The style which he made his own, and which was then at the height of popular favor, borne on the wave of admiration for the real strength and originality of his works, has waned as all fashions must wane, says Professor Hamlin, which are not the result of a spontaneous movement of taste, but ride into favor on the back of some passing whim or on the merit of the achievements of some one person or coterie. The Capitol, at Washington, which occupies the first place on the Brochure list, is impressive by its magnificent size and good proportions. Next on the list comes the Boston Public Library, McKim, Mead & White, architects. This building, however, was avowedly inspired from the "neo-Grec" Bibliothèque St. Genevieve of Labrouste, at Paris, as far as the façades are concerned. The third on the list is Trinity Church, Boston, with which selection no one can quarrel, except possibly with the fact that it is not higher up in the list. Fourth comes the Congressional Library at Washington. Messrs. Smithmeyer, Peltz and Edward P. Casey, architects. It is a handsome building, and with the exception of the Hôtel de Ville, at Paris is the most handsomely decorated building in the world. Next on the list comes the Library of Columbia University, New York city, McKim, Mead & White, architects. It is an impressive building, and in the main seems well adapted for its purpose, although it is not a specially convenient library building. Trinity Church, New York city, of which Richard Upjohn was the architect, is a handsome building, and is one of the most beautiful churches we have in America. Seventh on the list comes the Madison Square Garden, New York city. It is a fine building of its kind, but is reminiscent of Seville. Eighth on the list comes St. Patrick's Cathedral, New York city, James Renwick architect. It is a fine type of work of its class. Ninth on the list is the Biltmore House, at Biltmore, N. C., of which the late Richard M. Hunt was the architect. This is perhaps the finest and most palatial residence erected in the last half of this century, and is certainly the finest in America, and does great credit to the memory of the architect who created it. Last on the list is the City Hall, New York city, of which Mangin & McComb were the architects. It was finished in 1812, and is a remarkably fine building. It is one of the handsomest buildings ever built in America, and we trust it may long be preserved as an object-lesson in architecture.

From the last list we miss the beautiful house of W. K. Vanderbilt of New York, the State Capitol at Hartford, Conn., and the Jefferson Market Court House, although we can dispense with the four Richardson buildings mentioned last on that list in view of the fact that we already have his masterpiece. After the ten buildings which have been named received the highest number of votes, there was still another list of ten which is also attractive. First on this list is the Corcoran Art Gallery, Washington, D. C., Ernest Flagg, architect; then the house of W. K. Vanderbilt, New York; the Fine Arts Building, Chicago, Ill., Chester B. Atwood, architect, the New York State Capitol, at Albany, N. Y.; the Hotel Ponce de Leon, San Augustine, Fla., Carrère & Hastings, architects; then the Court House and Jail at Pittsburg; Pa., H. H. Richardson, architect; the Century Club, New York, McKim, Mead & White, architects; the State Capitol, at Hartford, Conn., which is erroneously given to H. H. Richardson instead of to R. H. Upjohn, in our contemporary's list. The American Surety Building, New York city, Bruce Price, architect; and, lastly, the University Club, New York city, McKim, Mead & White, architects. Certainly this is a list of very fine buildings, and some of them are of sufficient importance to enter the first list.

THE PARIS EXPOSITION AND SOME OF ITS BUILDINGS.

FROM whatever point of view it is regarded, the task set before the organizers of the Exposition on the banks of the Seine was a stupendous one. During the half century that has elapsed since the inauguration of international exhibitions, the craze for them has waxed and waned, and has at last shown signs of approaching decrepitude, so that it is no exaggeration to say that during the last five or six years the most supreme efforts have been put forth by all of the most eminent men in France to make the Exhibition of 1900 the most memorable in the history of mankind. The task was no easy one. To galvanize into life a moribund institution, to eclipse all that Paris has done in the past, to teach without being tiresome, and to amuse and interest without being vulgar or trivial, such were but a few of the thousand aspects of the problem, and an examination of the plans shows that the result will be both successful and brilliant. The English Architectural Review recently had a most important article upon the Exposition by Mr. A. Anderson, dealing with the leading features of the Exhibition, and from this we obtain our information.

The total area of the Exhibition grounds is 270 acres, and the expenditure is estimated at twelve and a half million dollars, but it will doubtless greatly exceed this sum. It has been declared with more or less truth that the successful exhibitions in Paris have been characterized, among other things, with the alternate predominance of the architect and the engineer, and certain it is that the Exhibition of 1889 was a triumph for the latter. The Eiffel Tower dominated the entire scene and diverted attention from almost everything else. This year, however, the engineer will be, comparatively speaking, in the background, and the architect will have his day. The problem put before the architects of every section, has been to symbolize in stone, or its imitation, the objects for which each building was destined. First

among these comes M Binet, the designer of the main entrance gateway of the Exposition on the Place de la Concorde. It may be regarded as a most dangerous experiment, the result of which it is too early, as yet, to criticize. The gateway epitomizes the whole exhibition. It is of grandiose proportions, brilliant coloring, and profuse decoration. It consists of three large bays which support a circular crown on which rests the cupola. On either side of the front bay is a minaret visible from all parts of the city. These minarets are connected with the main structure by friezes. It is impossible to state the style of architecture he has adopted for this entrance. It seems to suggest the Byzantine epoch; it certainly suggests the East. The "Grand Palais," the "Petit Palais," and the "Alexander III." Bridge form the principal elements in the large new avenue opened up by the Champs Elysees, crossing the Seine and terminating with the gilded dome of the Invalides. The Grand Palais is

THE ARCHITECTURE OF OUR NEW COLONIES.

WITHIN the past year and a half we have come into possession of a number of buildings in widely scattered parts of the globe. We have never seen any adequate treatment of the architecture in the Philippines, Hawaii, Porto Rico, and Cuba until Mr. Montgomery Schuyler contributed an article on "Our Acquired Architecture" to the last number of the Architectural Record. The profuse illustrations show cathedrals, palaces, government buildings, dwellings, etc. Hawaii naturally claims first attention, as she was knocking at the door long before we entered into our war with Spain. Hawaii was architecturally Americanized years ago, and, as Mr. Schuyler aptly remarks, the missionaries induced the simple Kanaka to believe that the second best was quite good enough for him. The buildings consequently reflect, though darkly, the modes of building in vogue in the United States at the same period. The buildings are pretentious, and

VIEW OF ARCH, SHOWING "BUENA VISTA" THROUGH PORTE-COCHERE, "HILLCREST HALL" IN HILLCREST MANOR, GREENWICH, CONN.—See page 57.

to be a permanent structure and will be a monumental addition to the public buildings of Paris. It will prove an ideal building for the exhibition of works of art. After the Exposition it will be used for the same purpose as the Palais of Industry which was destroyed to make way for it, and here will be held the annual salon. The total cost of the building was $4,000,000. The Petit Palais is the work of M. Girault, and is intended for the Retrospective Art Exposition, and will be used as a permanent gallery of modern painting and sculpture. This cost $2,000,000. The bridge which connects two sections of the Exposition was built with special reference to the architectural effect, and the pylons decorated with sculpture will be most beautiful. The entire cost of the bridge was $1,400,000, and a large part of this was devoted to the purely architectural features. All the buildings facing the avenue which leads from the bridge are of a temporary character. The numerous buildings on the Esplanade des Invalides and the Champs de Mars seem well adapted for their purpose, but it must be said that some of them are not particularly beautiful and decoration seems to run riot. It is too early, however, to pass a severe judgment upon them.

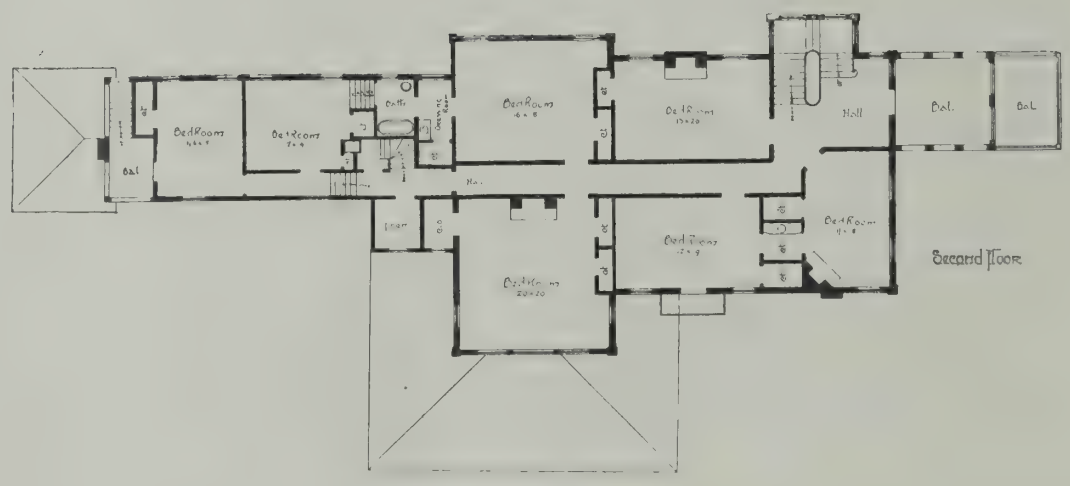
nothing can be worse than the old palace of Honolulu where a stone façade has been built on cast iron lines. "Decidedly, as architectural missionaries, we have not thus far shone in the Pacific. Our architectural procedures have been enough to vitiate the taste of an archipelago."

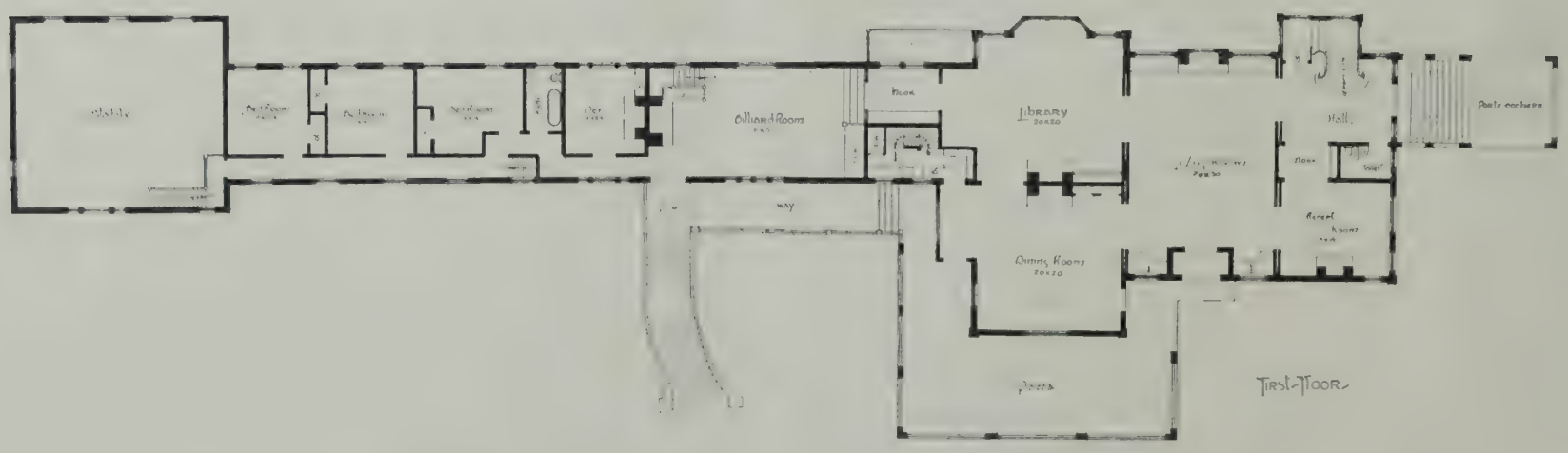
In the Philippines there is really no architecture except what has been imported. The habitations of the natives answer their purposes admirably, but they must not be called architecture. The hut, the bungalow, and the more pretentious dwelling appear very much alike both in the Philippines and in the Spanish Main, but those in the Far East show a Chinese origin in the details. The finer buildings in both the Spanish East and West Indies do not derive their principles of construction or ornamentation from Spain. The common building in the Philippines is indigenous, while in the Antilles it is exotic, since the extermination of the natives was a preliminary to the Spanish taking possession. In both cases the buildings which really have any pretensions to architecture are imported; this holds true both for religious and secular architecture. Stucco predominates, and with a few exceptions no attempt to erect very expensive buildings was made, for the Spaniards have always been bad owners of colonies, looking for what could be squeezed out of the fertile islands without regard to their material prosperity. The Church, however, waxed wealthy and built elaborate churches and convents: they are in bad taste. Plenty of ground is always left in front of them so as to afford an excellent view, and in this they were wise. The smaller churches are very much alike and are scarcely modified by local conditions, and there is little correspondence between the exterior and the interior, none of that eternal fitness between the outside and the inside of a building which marks all good architecture. Public buildings were built on the same lines as those in Spain. The public buildings of Manila have their impressiveness, says Mr. Schuyler, and he also considers it a matter for national congratulation that our new possessions seem to be supplied with all the public architecture they are likely to need for a good many years to come, as with all their faults the buildings of Spanish origin are picturesque.

THE COMING VILLA.

A HANDSOME wooden house costing $50,000 may be quickly destroyed by fire caused by a mouse gnawing a match, or the carelessness of a servant, resulting in large monetary loss and, perhaps, the destruction of life. Hitherto almost all country houses in the United States have been of wood, because such a house was less costly than a fireproof house, and because it is generally believed that a steel-framed building must of necessity be inartistic. Mr. Charles Barnard, in an interesting article in The Criterion, gives some interesting and important facts as to the comparative cost of steel-frame fireproof and wooden dwellings. For purposes of comparison he selects an ordinary two-story pitch-roof building measuring 25 x 30 feet. The steel frame or skeleton of the ordinary fireproof building costs, with all the columns, beams, and girders in position and ready for the floors, roofs, and partitions, about seven cents a cubic foot of contents. A two-story dwelling of this kind

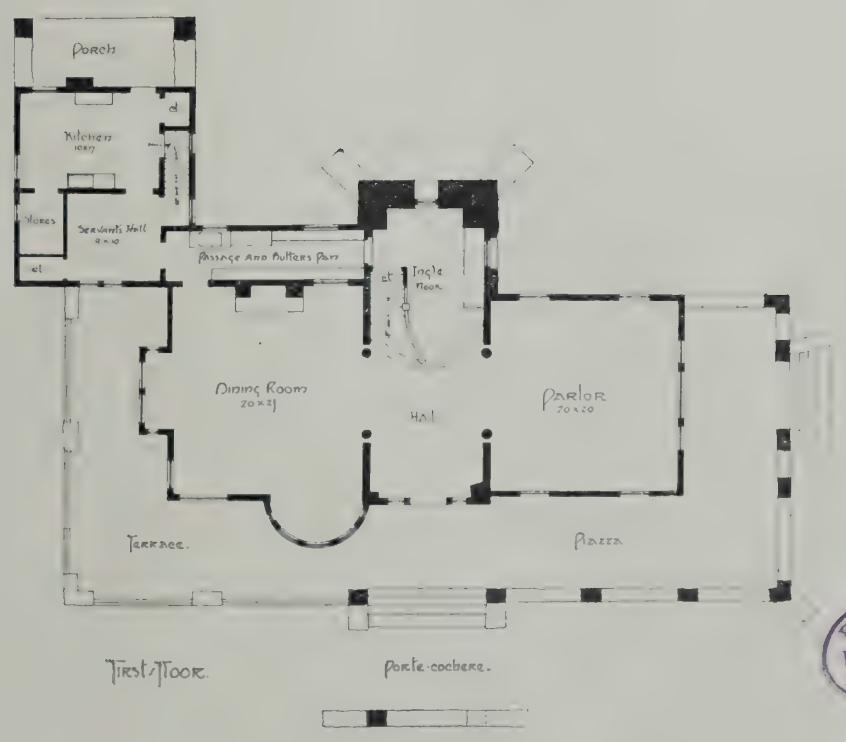
(Continued on page 56.)





"BUENA VISTA," A RESIDENCE AT HILLCREST MANOR, GREENWICH, CONN.—See page 57.

MR. E. E. HOLMAN, ARCHITECT.



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"STONYCREST," A RESIDENCE AT HILLCREST MANOR, GREENWICH, CONN.—See page 57.

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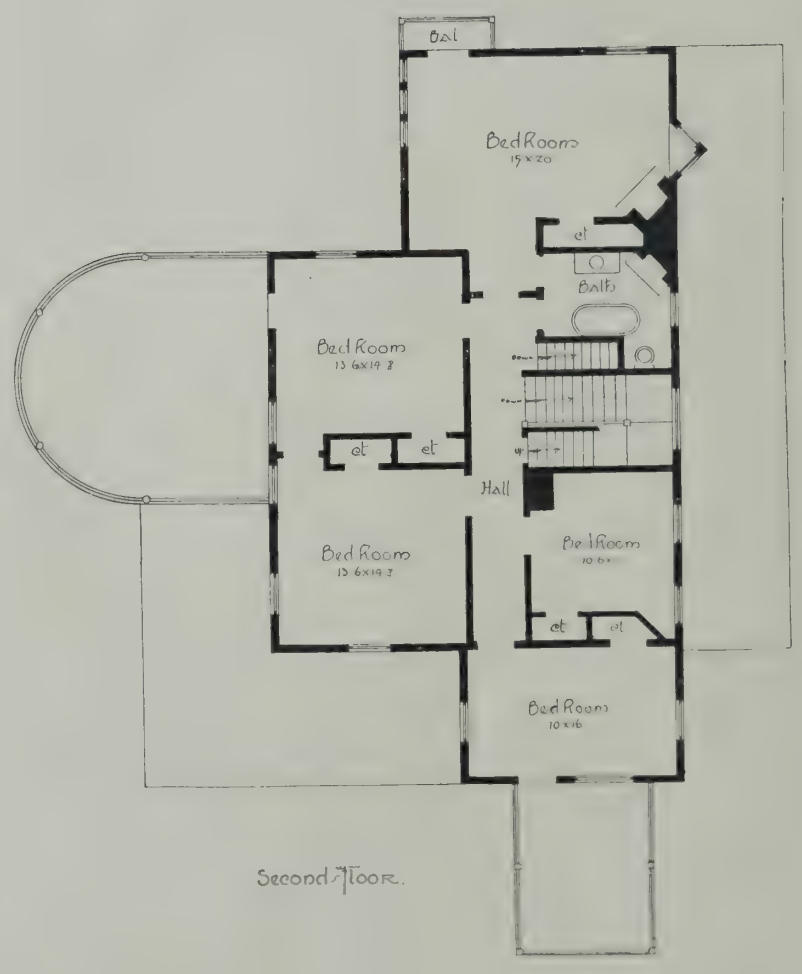
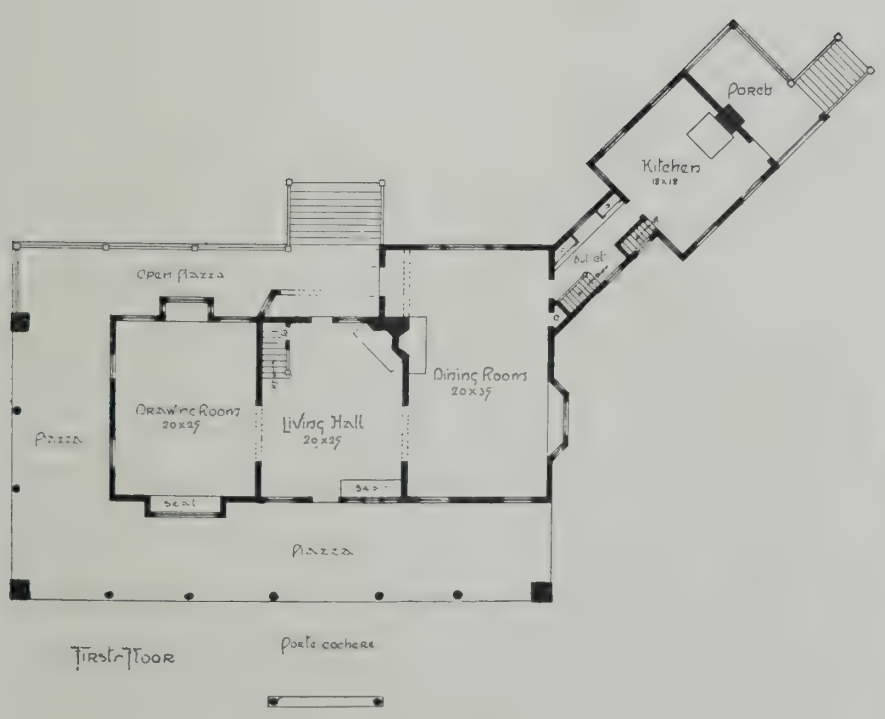


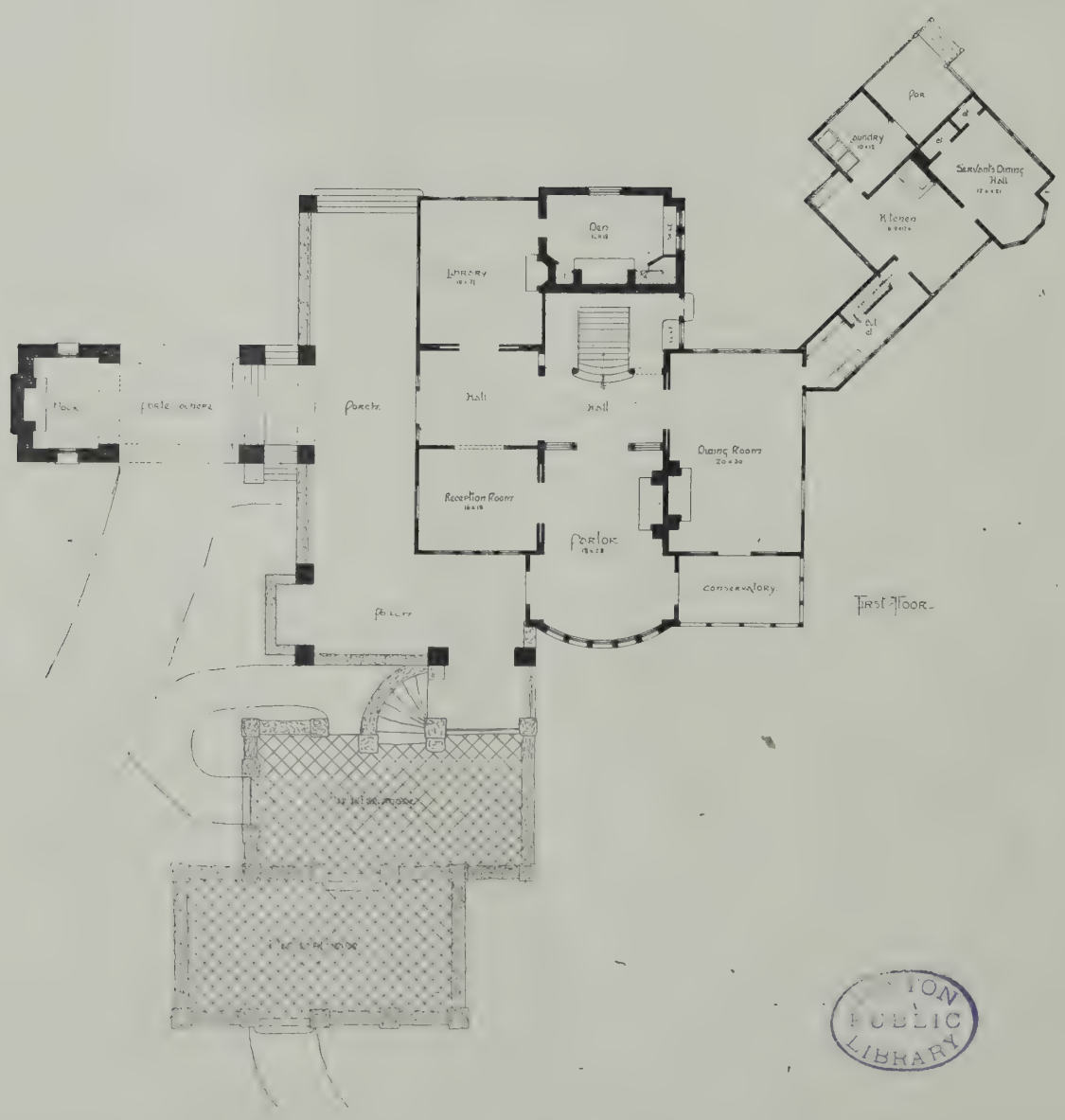
"BREEZEMONT," A VILLA AT HILLCREST MANOR, GREENWICH, CONN.—See page 57.

MR. E. E. HOLMAN, ARCHITECT.



"BLYTHEWOOD," A DWELLING AT HILLCREST MANOR, GREENWICH, CONN.—See page 57.

MR. E. E. HOLMAN, ARCHITECT.



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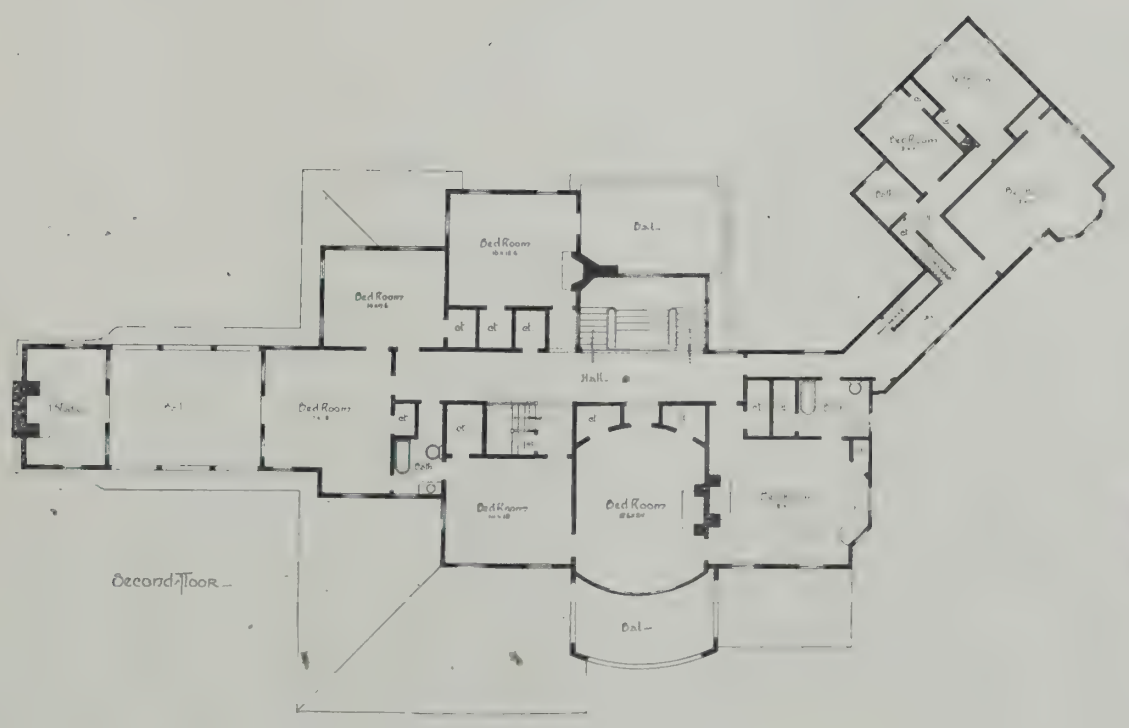
"HILLCREST HALL," A RESIDENCE AT HILLCREST MANOR, GREENWICH, CONN.—See page 57.

MR. E. E. HOLMAN, ARCHITECT.



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"HILLCREST HALL," A RESIDENCE AT HILLCREST MANOR, GREENWICH, CONN.—See page 57.

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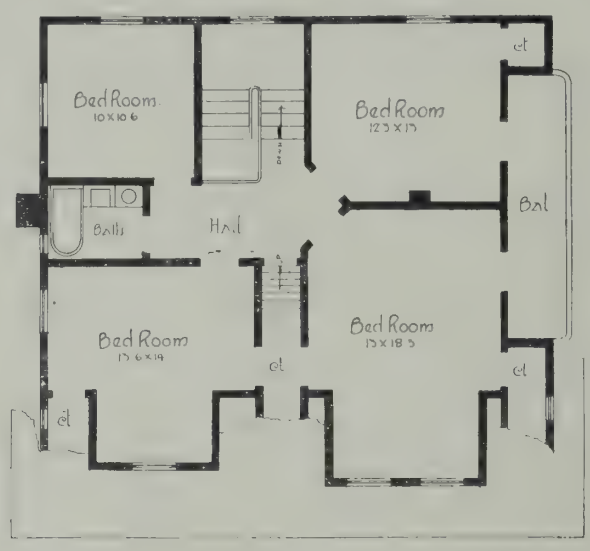

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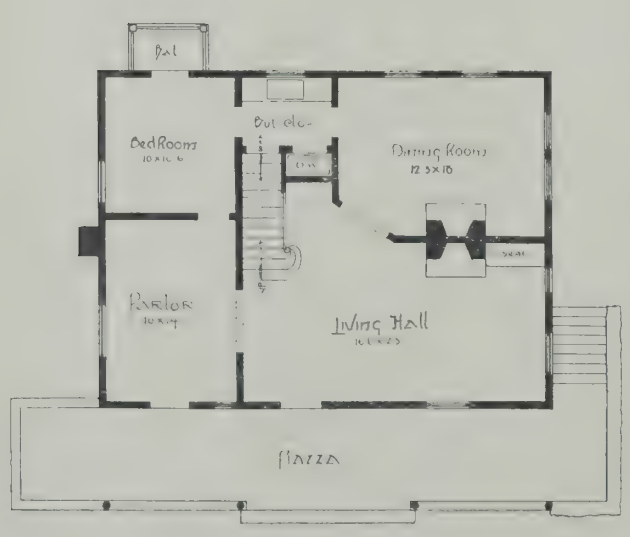


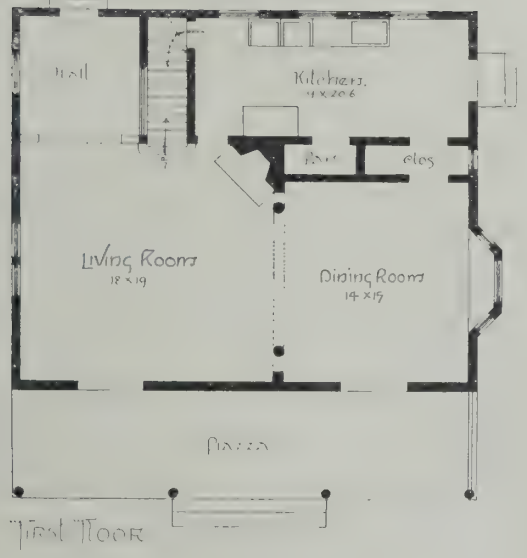
First Floor

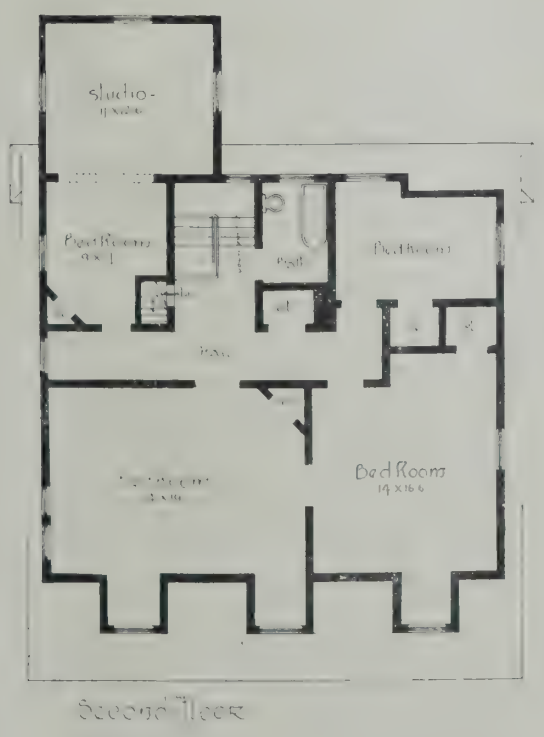
"CRAGS," A DWELLING AT GREENWICH, CONN.—See page 59.

MR. E. E. HOLMAN, ARCHITECT.

"FAIRVIEW," A COTTAGE AT GREENWICH, CONN.—See page 59.

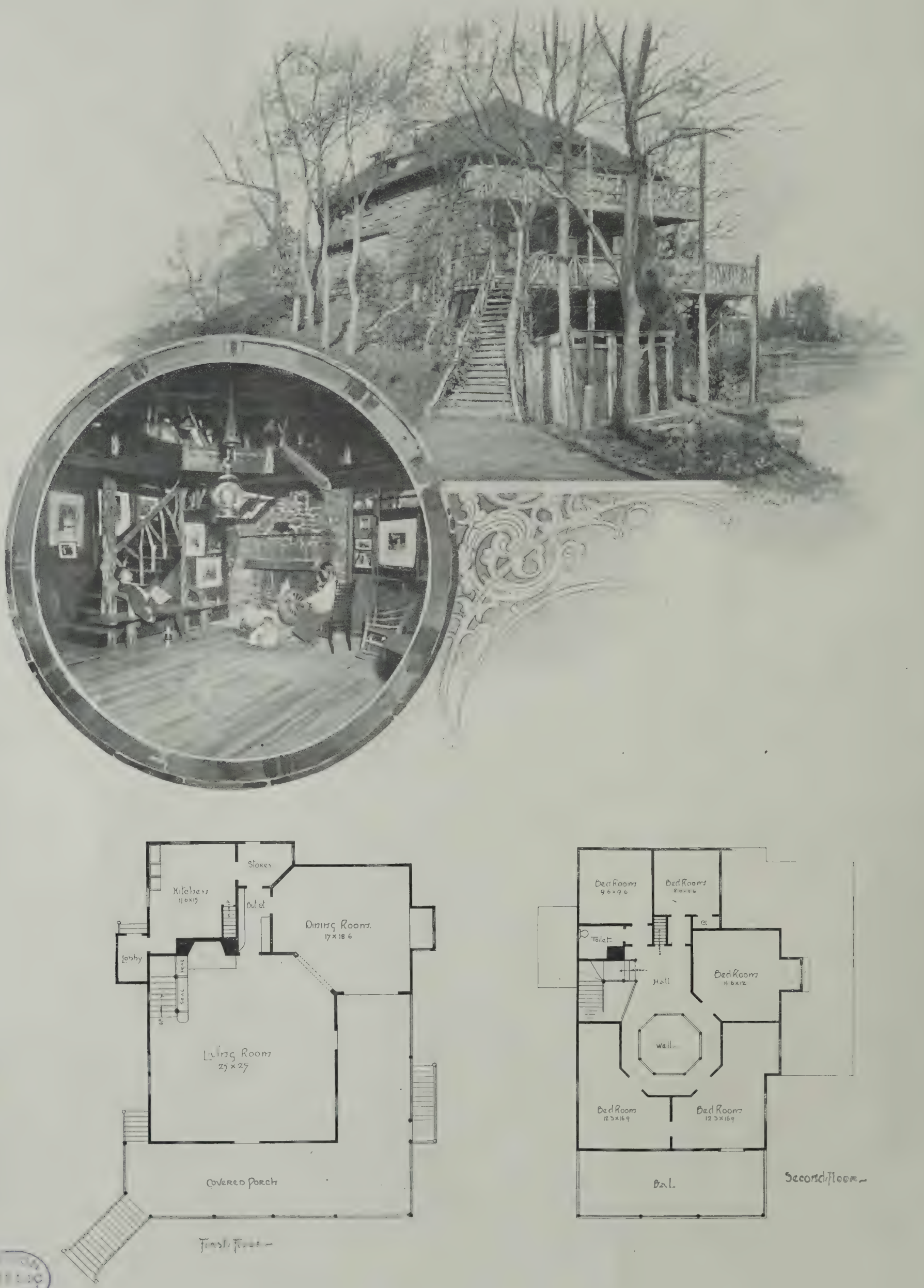
MR. E. E. HOLMAN, ARCHITECT.





"WHITE ROCK," A COLONIAL COTTAGE AT GREENWICH, CONN.—See page 59.

MR. E. E. HOLMAN, ARCHITECT.



"CLIFF EYRIE," A LOG HOUSE AT GREENWICH, CONN.—See page 58.

MR. E. E. HOLMAN, ARCHITECT.

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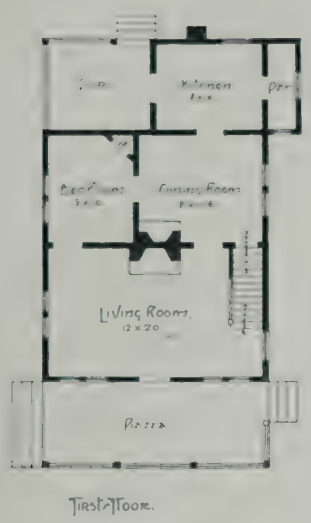

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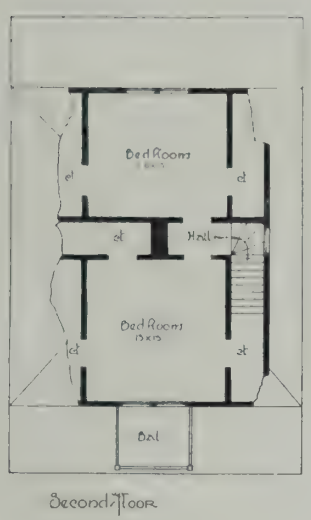
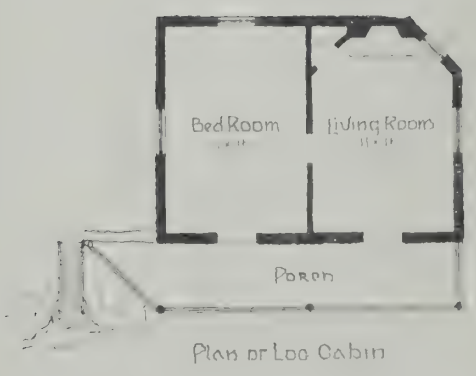


Second Floor.

"TREE TOP," A COTTAGE AT GREENWICH, CONN.—See page 59.

MR. E. E. HOLMAN, ARCHITECT.



Plan of Log Cabin

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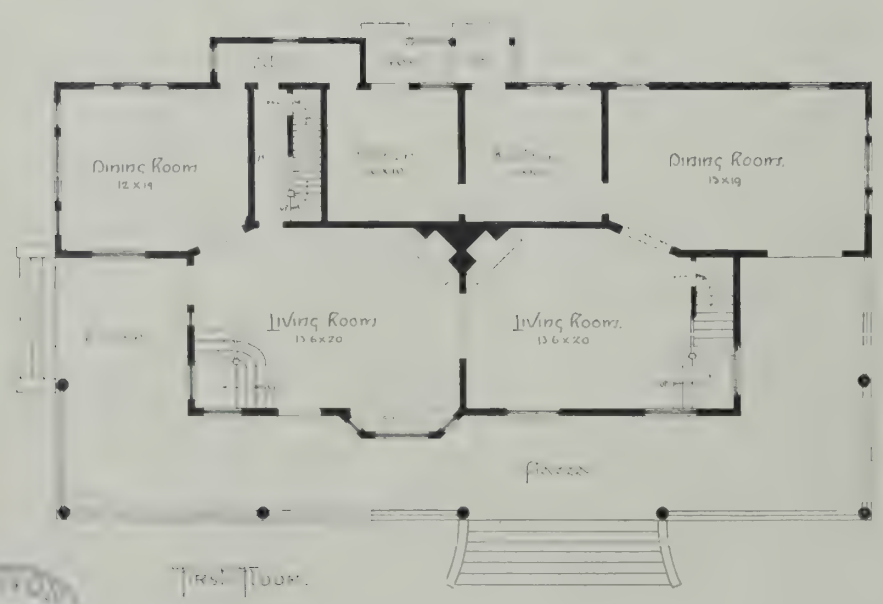
"COSYCOTE," A LOG CABIN AT GREENWICH, CONN.—See page 59.

MR. E. E. HOLMAN, ARCHITECT.



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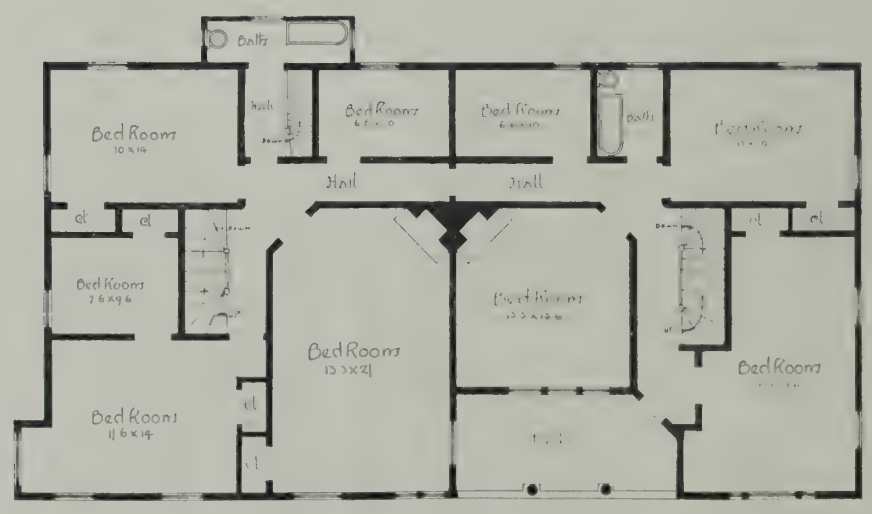
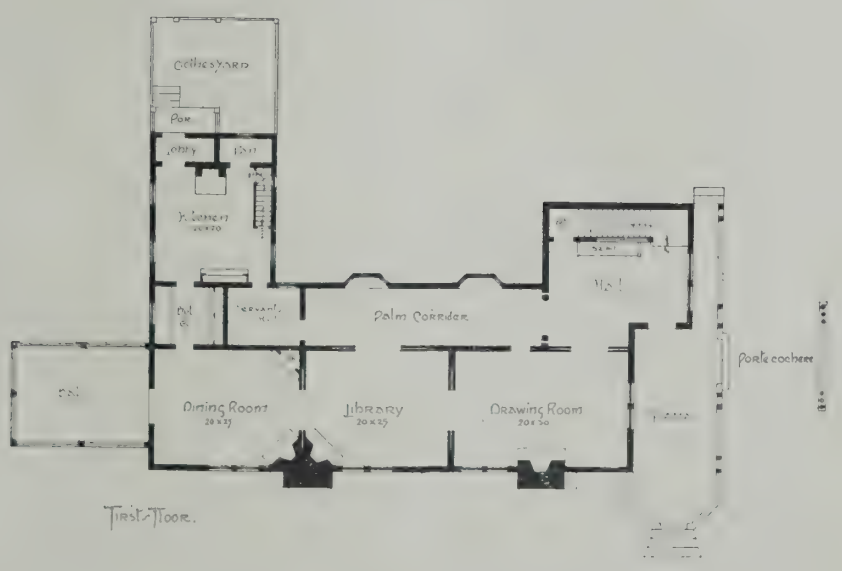


Second Floor.

"BELLRICA," A SPANISH VILLA AT GREENWICH, CONN.—See page 59.

MR. E. E. HOLMAN, ARCHITECT.



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"HILL TOP," A RESIDENCE AT STAMFORD, CONN.—See page 59.

MR. W. K. BENEDICT, ARCHITECT.

THE COMING VILLA.

(Continued from page 43.)

needs only a comparatively light frame, and could be built for six cents or less a cubic foot, and in favorable locations for perhaps five cents. A house of 25 x 30 feet, 10 feet high in the first story and 8 feet in the second, and with an attic, would contain, without counting the cellar, 17,250 cubic feet. At six cents the steel frame would cost $1,035. This is independent of the cellar and foundation walls, which would be no greater than for a wooden house. Such a building would have three floors, each having 750 square feet of surface. As the load on such floors would be comparatively light, flat brick arches six inches deep could be used, and could be put in place for about ten cents a square foot, or about $225, with an allowance of about five per cent. for the stair walls. Such floors could be sheathed alone with one thickness of floor boards and finished below with a light coat of plaster. The floors would be soundproof and fireproof, and would sustain at least 1,000 pounds per square foot, with any load and need not carry even its own weight, any material that is fireproof and watertight can be used. The most simple way would be to enclose the entire structure with the same fireproof brick used in the partitions. This would cost $120. We now have a fireproof structure that cannot be destroyed, even though its contents were burned. The problem of covering these brick slabs on the outside opens the new field for exterior decoration. One way would be to sheath the outside with wood, with clapboards or shingles. This would not, of course, prevent it from taking fire from adjoining buildings, but being fastened to the brickwork, would burn slowly and would not injure the building materially. A better way would be to cover the outside with brick tiles of terra-cotta or artificial stone, natural stone, or marble, or a mixture of these materials, and when we consider the great variety of colored bricks which are now upon the market, it will be seen that the chances for artistic decorations are almost infinite, and while somewhat more costly than wood, the difference is not so great as to be prohibitive, and is more than offset by the manifest advantages of such material. The price of wood has increased greatly within the last few years, and it is doubtful whether it will ever be cheap again. The cost of steel has advanced slightly, but not so as to interfere with its being used for building purposes. These figures were obtained by Mr. Barnard after consulting with competent builders and manufacturers, and they clearly show that a fireproof building is not much more costly than a wooden building of the same size, and, moreover, a steel building lends itself readily to any style of manufacture, and with the right selection from our wealth of fireproof materials there is no reason why a steel frame building may not be as artistic, or even more artistic, than a wooden house; certainly it would be much safer in a sanitary sense and would enjoy immunity from fire.

INTERIOR VIEW OF "HILL TOP," A RESIDENCE AT STAMFORD, CONN.—See page 59.

THE NEW YORK PUBLIC LIBRARY.

The trustees of the New York Public Library say that $2,500,000 is not enough to build the library which the city ought to provide on the old reservoir site for the Astor, Lenox, and Tilden foundations. The reasons why a large appropriation is necessary are that the class of labor and building matarials has increased 25 per cent. to 30 per cent. since the library plans were drawn. The constant accessions to the libraries make larger accommodations imperative. Since 1897, when the total was 461,943 volumes, the number has grown to 662,365 volumes. The number of the readers has also increased from 103,384 to 501,092. Better systems of heat, lighting, and ventilation have also been perfected, and the new building promises to be a model of its kind.

"HILLCREST MANOR" AND "CRAG TERRACE," GREENWICH, CONN.

The value of country houses, where the occupants will remain many months of the year, and possibly all of the time, is dependent largely upon the environment as well as the beauty and convenience of the houses themselves. Where a number of houses has been erected by one owner or builder, there is apt to be a sameness about them which suggests too much the mushroom growth of some suburban places, built by speculators with an eye to present profit rather than future benefits to the owners. This is, however, not always the case, and we have selected "Hillcrest Manor" and "Crag Terrace" as examples of what ought to be and what may be done in this way. Both properties are in Greenwich, Conn., which is one of the favorite residential sites near New York. Here the owner and builder, Mr. Joseph D. Sawyer, has built up a settlement of high-class houses upon park lines which are radically different from the ordinary ones.

Both properties are within the boundaries of the town of Greenwich, in a beautiful and diversified region embracing hill, valley, ravines, fresh-water streams, and the Sound. It is an ideal location for a settlement, and upon it Mr. Sawyer has constructed a series of artistic houses, built in different styles, which harmonize with the surroundings. We have rarely seen more diversified architecture in a single locality, and they show what can be done by persistent effort in developing beautiful houses harmonizing with their environment.

The main idea has been to secure eligible sites in a fine country by the purchase of a number of contiguous farms, then to develop them, making the most of the remark-

able natural advantages, and finally to build upon this property houses which should combine in a rare degree architectural beauty, fine location, and convenience. This end was attained by careful attention to the considerations which are the controlling factors in the selection of residential sites by business men: The distance should not be over fifteen or twenty minutes' drive from the railroad station, and be readily accessible by way of good roads; it must be within fifty minutes of the City of New York, and have frequent express trains; the outlook must be exceptionally fine and extensive, and include a water view; there should be perfect drainage, excellent water supply, no malarial conditions, coolness in summer, and freedom from mosquitoes; it must be within easy driving distance of golf and yachting clubs, fishing, boating, and bathing; and the soil must be rich, so as to respond readily to culture, as one of the conceptions was to form a private Arboretum extending through the property.

With these qualifications in mind, farms were examined in a number of the counties near New York, and finally, thirteen years ago, a property on Palmer's Hill, at the extreme eastern end of Greenwich and two and one-half miles inland, was purchased, and the improvements in "Hillcrest Manor" were commenced. The property was rich in soil, rocks, trees, and views, all essential factors in its subsequent development. The rocks, covered with lichens, were to form the foundations and arches shown in the various illustrations.

The first work done was to lay out the roads, build two Park entrances, the Arboretum, and make extensive plantings of both fruit and ornamental trees, including a choice plantation of evergreens. Part of the plan consisted in grouping plantations in different portions of the property, so that later a plot of several acres could be shown to a prospective purchaser, with the shrubbery, fruit, and ornamental trees in mature growth near the future building sites. The main road through the property, nearly a mile in extent, is bordered almost its entire length with the Arboretum, which contains over one thousand varieties of hardy shrubs, trees, and plants, glimpses of which are seen in several of the engravings. The collection of evergreens in the finer varieties of Retinospera is especially interesting. This garden has been planted so as to give a succession of bloom. In winter the bright-barked shrubs and trees contrast effectively against an evergreen background, and there is no day, in eight months of the year, when a saunter through it will not reveal some new phase of plant life coming into bloom.

The next move in the project was to build at each of the entrances to "Hillcrest Manor" houses in keeping with the outlook, and which would comport with its great natural advantages. The first new house built by Mr. Sawyer was "Hill Top," which stands at the eastern entrance to "Hillcrest Manor." The other houses are given in detail in the following descriptions.

"STONYCREST," AT HILLCREST MANOR, GREENWICH, CONN.

ON page 45 is presented an illustration of "Stonycrest," a residence erected at the western entrance of Hillcrest Manor, by Mr. J. D. Sawyer, from designs by E. E. Holman, architect, 1020 Chestnut Street, Philadelphia, Pa. "Stonycrest" has a very heavy foundation of rustic stone, with bastions at the corners, built so as to give great solidity; this is accomplished by a large base with gradually receding sides. One of the chimneys is outside, built of large field stone, with a stained-glass window in the center, and with a separate flue at each side. The stone pillars, wide verandas, carriage porch, arched stone entrance with iron-banded oak door, with carved oak, griffined lintel; the house, with its curving, shingled sides and heavy overhanging cornices, and roof lines of varied heights, makes a structure somewhat in the Romanesque style of architecture, yet in its interior arrangements it is made to conform with the requirements of a country villa in the suburbs of New York. The photographic view of the hall of "Stonycrest" gives an excellent idea of the interior, showing the four heavy, carved columns, the stairs with low, curving, carved rail, the depressed tiled "Inglenook" with its heraldic stained glass window, and the big crane in the seven-foot fireplace opening. The parlor is treated in red and white, and the dining-room in Pompeian red. The dining-room also contains a black iron and terra-cotta combination mantel six feet square, plateglass observatory windows—features all conducive to the making of an attractive house. This hall and dining-room have high paneled wainscots, while the former has a beamed ceiling. The servants' sleeping-rooms are in a separate dwelling over the kitchen, connected with the main house on the second story but not on the third, thus leaving the third story free for family and guests. An air space, with windows for ventilation, makes the third story perfectly cool in summer. The house has in the cellar a fireproof safety vault, a space suitable for a bowling alley, and also a laundry, housekeeping closets, toilet-room, boiler-room, etc. The second story has a Moorish smoking-room, connecting with a balcony over the carriage porch, from which one enjoys an extended view of sea and land. The third story has a billiard-room and two large sleeping-rooms. The house contains fourteen bedrooms and three bathrooms; it has also a desirable feature—an additional toilet adjoining a bathroom, not a necessarily expensive adjunct, as the same soil pipe is used. One of the baths is a large, square center tub, with shower, and two of the bathrooms and toilets have tiled floors and sides, porcelain fixtures, and exposed plumbing.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

"BUENA VISTA," A RESIDENCE AT HILLCREST MANOR, GREENWICH, CONN.

WE present on pages 43 and 44 "BuenaVista," a residence belonging to E. Hope Norton, Esq., of New York, also built by Mr. Sawyer, and designed by E. E. Holman, architect, 1020 Chestnut Street, Philadelphia, Pa. We illustrate this house with a colored plate on the cover, together with other views (including the artistic arch view), which we present on page 43. "Buena Vista" is a dwelling treated in the Spanish and the Italian style of architecture, with the attractive picturesqueness of the East, combined with the best that the modern civilization of the West can furnish, and is, as all good architecture should be, a color creation as well as a form creation. Its extensive roof, of bright red Spanish tile, its Portland cement sides meeting the green turf and lichen-covered ledge, its buff-colored brick corners, trimmings, and chimneys, its turrets, arches, and balconies, and its quaint windows, form a color scheme that harmonizes attractively with rocks, trees, shrubs, and sky. The house was built to conform to the site, and to the beholder has the rare quality usually so foreign to a new house of antiquity, instead of the garish newness naturally belonging to its brief existence. "Buena Vista" was only a complete possibility on account of its location, in the center of ten acres, some thirty or more feet above the King's Highway and about 700 feet distant, it being literally perched on a rocky cliff following the gradual fall of the ground, until it covers in length about 230 feet. The house has four entrances, one is approached by a narrow walk leading over the ledge to the Spanish arched entrance and wide veranda that overlook valley and Sound. Another very effective entrance is from the garden side, up a massive flight of some fifty artificial stone steps to the veranda leading to billiard-room and den. The main entrance is from the "carriage porch," through an arched passage-way intended as a palm gallery. The staircase hall is finished in quartered oak, as is also the staircase, with its carved newels and paneled soffits. This hall is provided with stained glass harmonizing in color and design with the style of architecture. The main windows throughout the house are plate glass, and the upper sashes are leaded in artistic designs. The window and tower plan, as shown in the illustrations, will bear close scrutiny in the varied design of casement, belvedere, arch, and curve, which give variety and uniqueness to the whole. From the entrance hall at the left is the reception-room, finished in gold leaf and enamel-white woodwork, with pink walls; the hardware of this room is gold plated. The great hall is 20 x 30 feet, finished in quartered oak, with high wainscot, beamed ceiling, and mantel; the hardware is oxidized silver, which, in connection with regular bronze, is used through the remainder of the house. The dining-room, 25 x 25, is wainscoted and finished in flat oak, with two elaborate curved front glass and china buffets, connected by a broad oak settle, constructed to harmonize with the woodwork. A butler's pantry, with lift, adjoins it, and is wainscoted in pine, natural finish. The library is 25 x 25, is finished in mahogany, and furnished with a series of observation windows. This room connects with billiard alcove, which has settles and broad windows leading to north balcony. The billiard-room, 18 x 23, is a charming apartment, the trim a sea green, with vivid red walls of Japanese grass, open fireplace, large picture window, and veranda; the outside staircase leads directly from this room. The bachelors' suite, including the den with its cozy fireplace, tiled bathroom with shower, and four bedrooms complete the main floor. All the servants' quarters are on the floor below this; they consist of four large bedrooms, and bath, laundry, kitchen serving pantry with sink, kitchen, servants' hall, and servants' veranda, wine closets, housekeeper's rooms, boiler room, and cellar. And still below this floor are two large rooms for the men servants, with toilet; and below this again ample cellar and storage room is made possible by the steep fall of the ledge on which the house is built. The third story contains the family bedrooms, two baths, a nursery, a conservatory balcony, and a large linen closet, with windows for ventilation, shelved and drawered to suit the most particular housekeeper. The fourth story contains the main tower, lookout room, an open tower balcony, and three large rooms. There are separate flights leading to the different towers, four in number, from all of which, as well as from veranda and windows, are extensive views of valley, hill, and Sound. The finish and decoration of "Buena Vista" are the best. The main rooms of first and second stories have hardwood floors of quartered oak or selected maple. Closets and presses have been built wherever possible, and the first floor contains settles in every available place; elaborate wooden coves to match the woodwork are built in the main rooms on the first floor; the bedrooms are hung with the latest designs in suitable cloth decorations. "Buena Vista," within and without, contains the best that the modern artisan can evolve for the comfort and satisfaction of its occupants. It is completely wired for electricity, has an extensive gas plant that lights every portion of the building, stable, and verandas; it has speaking tubes and electric bells, and a steam plant that heats the entire building; the water supply is ample, both in house and stable, and every prominent room in the house is provided with an open fireplace and mantel. The stable is complete in its arrangement and sanitation, three stalls and two box stalls, horse trough, harness closet, etc., two hay lofts, a coachman's room; stable is finished in hard pine shellacked. As an indication of the size of "Buena Vista," it is 230 feet long, contains seventeen different flights of stairs, and 160 windows. Even considering its size, it is so arranged that certain rooms or wings can be closed and the house brought down to the requirements of a moderate sized family.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

"BLYTHEWOOD," A DWELLING AT HILLCREST MANOR, GREENWICH, CONN.

ON page 47 we illustrate "Blythewood," erected for Mrs. C. P. Varew, from designs by E. E. Holman, architect, 1020 Chestnut Street, Philadelphia, Pa. It is a house of gables, balconies, and artistic window arrangement, and, like the other houses built by Mr. Sawyer, has an individuality quite its own. The architecture of the house follows somewhat a Gothic style. It has a veranda extending 14 feet wide on three sides. The hall is in the center of the house, with doors opening directly through to rear veranda, a feature difficult to improve upon for a country house. Through arches leading to the left, one enters the large parlor, and to the right the dining room, 25 x 30, with butler's pantry, back stairs, and kitchen beyond, with laundry in the basement and servants' veranda in the rear. The servants' quarters are in the kitchen extension, thus leaving the bedrooms of main house for family use. The second and third floors have a central hall, with bedrooms on either side, aggregating twenty, all having large closets. There are three bathrooms, and seven of the rooms have balconies, an especially attractive feature.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

"BREEZEMONT," A VILLA AT HILLCREST MANOR, GREENWICH, CONN.

EAST of Blythewood, on the crest of the hill, with extensive views from the windows and verandas, is the Colonial house, known as "Breezemont," erected and owned by J. D. Sawyer, and which we illustrate on page 46, in this issue. The open veranda on the north encircles a large tree, among the branches of which is a children's play-house, readily accessible by low-growing limbs. The porch of "Breezemont" has a curving front; the roof is supported by Colonial columns, balustrade built of stone, with stone arches. The living-room is 20 x 30 feet, with a seven-foot wide fireplace opening. The house contains library, living-room, staircase hall, dining-room, butler's pantry, kitchen, laundry, with set tubs; billiard room, two bathrooms, and nine bedrooms; veranda roof lookout; servants' staircase, and the usual appurtenances of a first-class dwelling. E. E. Holman, architect, 1020 Chestnut Street, Philadelphia, Pa.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

"HILLCREST HOMESTEAD," GREENWICH, CONN.

HILLCREST HOMESTEAD is a complete dwelling, of some twenty rooms, nearly hidden by large trees at the crest of the ridge, as shown in illustration, page 41. It has little claim to any special architectural merit, and is simply a country home, surrounded by eight acres of lawn, with flowers, trees, and shrubs in great variety and quantity, and is the original farmhouse of "Hillcrest Manor," modernized to meet present requirements. Owner, J. D. Sawyer.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

"HILLCREST HALL," A RESIDENCE AT GREENWICH, CONN.

WE present on pages 48 and 49 illustrations showing "Hillcrest Hall," which is the largest house owned by Mr. Sawyer in "Hillcrest Manor," Greenwich, Conn. The exterior features and scope of the house and approaches in a general way are as follows: It covers a plot, more or less irregular in shape, about one hundred and seventy-five by one hundred feet, located on high

ground with ample acreage. It has an extensive view, covering a wide expanse of Long Island Sound and a varied landscape. The architecture is American Renaissance with a feeling of Elizabethan in its long roof lines and gables, and a Norman effect, as shown in its huge arches and stone den. A bit of the Italian in its Esplanade, a touch of Naples in its quaint Pompeian court, with fountain, mosaic walk, and palms, combine naturally with the advantages of conservatory, veranda, carriage porch, and balcony, and the modern conveniences and requirements of this nineteenth century. The cellar extends under the entire house and is large enough to contain all necessary requisites, such as vault, boiler room, storage, housekeeping, and all other rooms necessary in a well appointed country house. The approach is by two roadways: the eastern entrance about twenty-five hundred feet in length, skirting the Arboretum, then edged with flower beds, and then between rows of overhanging trees (illuminated at night by electric lights, placed in the branches), and forming a perfect rural arch, ending at the carriage porch, which is a massive stone double archway, flanked by four gargoyles, which frame the distant picture of "Buena Vista," beyond which is an extensive view of the countryside. At this point this road joins the carriage roadway from the west which leads from "Hillcrest Terrace," skirting the extensive lawn and Esplanade until it meets the eastern road at the arch. An uncommonly effective feature is this Esplanade, which consists of two tiled rectangular courtyards, each about forty by twenty feet, edged by rustic walls and connected with each other and the veranda by a series of stone steps, all corners having large rustic stone posts, with heavy, rough capstones, on which are placed ornamental plants in terracotta vases. South of the courtyard is a sun dial on a huge granite boulder, and according to its motto "marks the shining hours." These courtyards, taken in connection with the rest of the stonework, add an imposing effect to the structure. The outer side of the carriage porch is utilized as a coachman's waiting room, with fireplace and crane, and at the sides are two stone settles. The carriage porch and veranda supports are six large stone arches, which, taken in connection with the stone pillars of the veranda, add still more to the unique effect referred to before, and shown in the photograph. From the western roadway a path leads to the lower Esplanade, thence to the second, and then by the stone staircase to the "Lookout" veranda (the railing of which is of artistic wrought iron, ending at east side in two huge wrought iron lamps surmounting the stone posts), and from that to the veranda itself. The covered veranda is from eighteen to twenty-six feet wide and is floored with combed grain Georgia pine. It has a mossy stone balustrade; the veranda gutters are copper, laid in the balustrade when built, and are connected with a drain; thus obviating the unsightly stains that so frequently disfigure a veranda front. The servants' quarters are in the kitchen extension, which is a twelve-room house, connected on the first and second stories with the main dwelling; this kitchen extension, as shown by the plan, is placed at an angle. In building this residence the advantages of a winter sun—and yet protection from the fierce winter storms, combined with the benefit of summer shade and cooling southwest breezes—have been carefully considered. Building the kitchen extension in this manner allows the sun to reach both ell and main house, making these rooms corner rooms; in fact, with few exceptions, all the rooms in "Hillcrest Hall" have at least two exposures. The side entrance through the Palm court affords ample protection in the most inclement weather. The roofed veranda on the northwest, on account of its extreme width, gives absolute shade in summer and only darkens the entrance hall. There are five balconies on second and third stories, several quite large, and so arranged that one is always in the shadow. The exterior is a combination of stone with cedar shingles; the veranda and roof cornices have the wide overhang that suggests comfort and shelter; the gables have the somewhat odd feature, brought out in the shingling, of swelling from the center outward, and around the entire building on a line with the second story window sills the sameness is broken by a course of sawed tooth shingles. The den on the east side, built of rough moss-covered field stone roofed with cement, and with stone balustrade, relieves the side lines and makes a large and desirable balcony from the east chamber; the curving belt courses following the lines of the arches also helps break the large expanse of shingle surface. The first story of "Hillcrest Hall" is 12 feet in the clear, with ceiling covers. The entrance hall is 18¾ ft. x 26 ft., entered by two 5 x 8 ft. doors, the one on the north being a Dutch door with beveled plate; the western door is also beveled plate, both being of quartered oak with iron trimmings, with sides framed and transomed in leaded glass. This entrance hall is wainscoted and trimmed with quartered oak, has settles, and is suitably decorated; it has three sets of sliding doors, 8 ft. 6 in. x 8 ft. 6 in., opening respectively to the library, staircase hall, and parlor. The parlor, 23 x 28 ft., an exceptionally sunny apartment, with curved front and four west windows reaching down to a low, wide settle which extends across the entire width of the room; the north window, opening on the veranda, is of opaque leaded glass. The four transoms over the bay windows represent the four seasons, a special design by Tiffany—"Spring" by apple blossoms, "Summer" the early ripening fruit, "Autumn" the red Baldwin apple and brilliant fall foliage, and "Winter" the bare, snow-laden branches. French beveled plateglass windows open to the conservatory. The fireplace has a seven-foot wide opening; the mantel is of special design, in keeping with the apartment. The walls are a cream yellow, with the ceiling in harmony with the general tone of the room. The mantel, settle, doors, and trim of this apartment are bird's eye maple, and the room is a charming creation of the decorator's art. The staircase hall, 18 x 20 ft., with its somewhat unusual staircase, is one of the special features of the house. The wide, sliding doors connect with the parlor and hall. From this hall you enter the dining room and the library, and a side door leads to the Palm court. There is also a lavatory, with outside window. The staircase is elaborately carved and paneled. It consists of one wide center flight to a landing, having a cozy window seat and settle and space for a Colonial clock. The stairs are seven feet wide, beginning with a flare to ten feet in the first few steps; on reaching the landing they divide into two flights, making a very effective stairway. The hall trim is of quartered oak, with oak paneled ceiling and dental cove. Wall and ceiling decorations blend with the two large stained glass Tiffany windows, whose delicate coloring throw a warm glow over stair landing, hall and wainscot. The library, 18 ft. 9 in. x 24 ft. 8 in., adjoins the entrance hall on the east. It has a fireplace, which has a hooded mantel, its supporting brackets being carved lion heads. The general tone of the room is green; the trim is birch, Santo Domingo mahogany finish. Leading from this room, concealed by a hinged, full-length framed mirror in the side wall, is an iron door opening into an absolutely fireproof den, 15 x 18 ft. Not a particle of wood is used in its construction; it is but one story high, built outside of the main house, with walls of stone and brick, iron beams, terra cotta fireproof filling, Portland cement roofing, and wire lathing. It has a large pressed brick fireplace, with side alcove for the safe; the windows are few, high, and with deep embrasures. Directly under the den, and entirely separate from the main house cellar, is a room with three small windows, reached only from the den by an iron staircase; it has a fireplace, cemented floor, and the walls are lined with iron-framed cases, conveniently pigeon-holed. The den, with its cellar and contents, is absolutely fireproof, and both are heated from the house boiler. The object is to have two apartments with but one entrance, under lock and key, where rare prints, papers, photographs, negatives, and other articles of intrinsic value to the owner can be stored in absolute safety, with ample space for systematic filing. Most important documents are often useless if they cannot be found when readily wanted. These rooms are built and arranged to meet these requirements. The dining-room is a handsomely appointed apartment, 20 x 30 feet high, wainscoted, and trimmed in dark Flemish oak, with red walls; it is a sunny room, facing the east, south, and west, with double beveled plate French windows opening into the conservatory. The windows in the east end of the dining-room front the palm court, enabling rays of the rising as well as of the setting sun to reach this apartment. It also contains an elaborate Flemish oak mantel, with a fireplace opening seven feet in width. Adjoining the dining-room is a large butler's pantry, 9 x 20 ft., trimmed and wainscoted in natural finish pine, and containing all the necessary requirements, including a separate closet opening also to the kitchen as a greater convenience for serving the dishes. The kitchen, 18 x 18 ft.; the servants' dining hall, 13 x 20 ft.; and the laundry, 12 x 20 ft., are on this floor, and are all wainscoted. The conservatory, connecting as it does with both dining-room and parlor by wide, beveled plate French windows extending to the floor, gives a very charming vista from either apartment. It has a thick glass, copper-flashed roof, tiled floor, and may be used in the summer as a veranda, and is heated from the house boiler. It is the intention of the owner to add a rose house, connecting with the conservatory, reached by steps, and on a lower plane, so as not to interfere with the view from the dining-room windows; part of the plan also includes a further glass extension in a grape house and a gallery 75 ft. long, ending in a 25 x 25 ft. "observation room" at the southeastern edge of the lawn. The second story of "Hillcrest Hall" is ten feet in the clear, and has the following rooms: On the extreme north, over the "carriage porch coachman's waiting-room," is a studio, with fireplace and northern windows, separated from the main house by an enclosed balcony, 12 x 23 ft. The floor of this balcony, as well as the other balconies, is covered with heavy duck canvas, and flashed and guttered with copper. The northwest end of the house has a suite of two bedrooms and bathroom, rooms decorated in robin's-egg blue. The west balcony bedroom, the front and back walls of which are made in a semicircular form, is 19 x 24 ft., and the room connected with it on the north, 18 ft. 6 in. x 20 ft., are both finished in bird's-eye maple, with mantel to match, and has effective wall decorations; a double French window opens to a balcony, from which an extensive view is obtained. The bedroom on the southwest corner is finished in birch, has two large closets, with a large tiled bathroom, 7 x 20 ft. (containing both needle and shower bath), which, in turn, communicates with a sunny nursery or sewing-room. The large east chamber has a charming balcony over the den. This floor contains nine large sleeping-rooms, three bathrooms, twelve closets, and three balconies. On the third floor is a long shuffleboard-room or, if desired, a bowling alley, 10 ft. 6 in. x 48 ft., a large billiard-room with a smoking balcony and a veranda, with a number of guest rooms and bath. In the fourth story of the main house are four rooms, and in the servants' extension, also on the fourth floor, are two excellent rooms, and over these six rooms is an air space for ventilation. On the roof of the main house is a "deck lookout," so constructed that it is not seen from the ground, and from which is an unobstructed view of nearly the entire horizon line.

The mantels of "Hillcrest Hall," on account of the large fire openings and extreme width of the chimney breasts, are all of special designs, matching the trim of the rooms and decorations; several have mirrors, but in the main the "motif" of the designs is a picture, a bas-relief, a hood, or a tapestry ornamentation. The house is so arranged that certain portions can be closed. All gas, water, steam-pipes, all electrical appliances, have special valves and switches for disconnection, thus enabling the occupants, if they so desire, to curtail the running expenses to that of any ordinary dwelling. The builder has endeavored to recognize the fact that the "house party" that invades a country residence probably a score of times in a year, need room, and plenty of it, for guests and extra servants; this house has it in unstinted measure, and yet in its normal condition, for the reasons given above, can be kept up without large expense. A brief recapitulation of the appointments of "Hillcrest Hall," we think, will prove that practically about every modern convenience and requirement has been combined in this dwelling. Perhaps a better idea of its size can be realized when we state it has 180 windows. Every room has a closet or press, some two, and all the principal windows are plate or leaded glass. It contains forty-three rooms, twenty-five of which are bedrooms. It has speaking-tubes, call bells, gas, and electric lights, is heated by steam; has a 2,000-gallon water-tank, with ample water supply; four bathrooms, finely appointed, with both shower and needle baths, set tubs, basins, lavatories, clothes-chute, conservatory, billiard-room, shuffleboard-room or bowling alley, isolated studio, fireproof den, bicycle room, dark room for developing photographs, coachman's waiting room, ten large fireplaces, two having seven-feet wide openings; a number of settles; and every appurtenance belonging to a modern dwelling.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

"CRAG TERRACE COTTAGES," GREENWICH, CONN.

The "Crag Terrace Cottages," seven in number, embrace a wide range of architecture, and are built directly on the shore of Long Island Sound, as seen from the different photographs. They are located at Sound Beach, at the southeastern end of the town of Greenwich, adjoining Stamford, on a bold rocky shore, as shown in the views, this particular point projecting into the Sound directly north of Stamford Light, and the "Crag Terrace Cottages" are at the eastern extremity of this point. An inlet harbor with sandy bottom suitable for bathing forms the eastern boundary of the property, the remainder of the shore line fronting directly on the open Sound.

"CLIFF EYRIE," A LOG HOUSE AT GREENWICH, CONN.

On page 52 we illustrate "Cliff Eyrie." Owner, E. Hope Norton, Esq., of New York; architect, E. E. Holman, 1020 Chestnut Street, Philadelphia, Pa. It is a log cabin, and is a real eyrie, on a real overhanging cliff about thirty feet above the water. It is a house that was designed for this particular site. It is "over all" about fifty-five by forty-five feet, and has a double storied veranda. The construction is heavy joists and timber, planed and sheathed with North Carolina pine, and well covered outside with tarred paper, with walnut slabs fastened to the exterior and mortised at the corners; the logs were cut in the winter so as to hold the bark, and after three years' exposure there has been practically no peeling. On account of the open joist construction spring balances were used instead of the regular window weights, thus solving the problem in this mode of treating windows. The interior decorations are made by using different colored stains, burlaps, cretonne, and light silk hangings. The main room, 25 x 25 ft., has a large stone fireplace and crane; the fittings are old-fashioned settles, spinning wheel, etc. From this room three Dutch doors lead to the dining-room, 18 x 20 ft., which has a cushioned bay window almost overhanging the water, draped and

screened by the branches of a large oak that seems almost to grow out of the house and towers far above it; one entire end of the dining-room opens with wide swinging doors to a veranda tea room screened and embowered in foliage. An alcove leading from the butler's pantry is used as a servants' dining-room; a kitchen, with set tubs, and back stairs, with a servants' side porch and a kitchen porch, complete the arrangements of the first floor. We reach the second story by a rustic cedar staircase, shown in the photograph; in the center is a balustered gallery open to the roof; five bedrooms and a bathroom lead from this gallery; two of the bedrooms have doors leading to the upper outside balcony. In the third story is a double bedroom and storage; the open gallery over the center of the living hall is festooned with a large Fyke fish net, which is decorated with different forms of sea fish, etc.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

"CRAGS," A DWELLING AT GREENWICH, CONN.

"CRAGS," of which we show a photograph on page 50, is, as the name implies, a house built on a veritable crag near the water's edge; the tide ebbs and flows close to the foundation on two sides; one pleasant feature about the location is that when seated at the dining-room table the four windows are so arranged that one has the feeling of being really "out at sea" "Crags" is a winter as well as a summer residence, has furnaces, open plumbing, set tubs, parlor, dining-room, kitchen, laundry, seven bedrooms, and bath; has two balconies, one directly over the water, and a wide veranda. A beach, where small boats can be hauled up beyond danger from storms, and where the bathing is excellent, an iron pier, shown in the photograph, and fishing rocks within a few feet of the veranda, complete the advantages of "Crags." It is owned by Mr. J. D. Sawyer.

Our engraving was made from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

"COSYCOTE," A LOG CABIN AT GREENWICH, CONN.

WE present on page 53 in this issue, "Cosycote," an exact copy in dimension and style of the frontier log cabin. From the veranda of "Cliff Eyrie" a flight of rustic steps skirts the cliff and leads to "Cosycote," a little three-room cabin on the edge of the cliff, from the veranda of which other steps lead to a miniature wharf and spring board for diving; from this veranda one can get quite satisfactory fishing in the season. Separated as it is from "Cliff Eyrie," and yet belonging to it, it is an ideal retreat from all confusion for either invalids or guests. Both "Cliff Eyrie" and "Cosycote," from their uniqueness of location and appointments, invariably attract and delight the visitor; for houses of this character the location is ideal, perched, as they are, on a high cliff, and embowered by large, overtopping trees, with the waters of the Sound beating against their foundations.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

"BELLRICA," A SPANISH VILLA AT GREENWICH, CONN.

ON page 54 we illustrate "Bellrica." Owner, J. D. Sawyer; architect, E. E. Holman, 1020 Chestnut Street, Philadelphia, Pa. It is built after the Spanish style of architecture, and, as shown by the floor plan, can be used either as one house or two, as the inclination of the occupant may desire. With the exception of two kitchens, two separate flights of front stairs, two baths, and four toilets, there is nothing about the interior of the house to suggests it being a double house, and the exterior is so arranged that the front door of one is a couple of large French windows, and the other a regular door, opening on the side. It is a success, either as a single or a double house; and as a single house, it makes an ideal country home. Aside from the veranda, extending across the front and a portion of each end, it has a servants' porch, and on the second and third stories are three balconies. In this house the rooms are arranged in suites. It contains sixteen bedrooms, also an open attic, ventilated with windows, so that the third story bedrooms are as desirable as the second. "Bellrica" has set tubs, modern plumbing, open fireplaces, and cellar under each house. The exterior is Portland cement sides painted a cream yellow, with red shingled roof.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

"TREE TOP," A COTTAGE AT GREENWICH, CONN.

ON page 53 we illustrate "Tree Top." Owner, J. D. Sawyer; architect, E. E. Holman, 1020 Chestnut Street, Philadelphia, Pa. "Tree Top" is on the same height with the tree-tops, hence its name. It is a little six-room cottage, with charming views from veranda and windows, a living-room, dining-room, kitchen, and sleeping-room on the first floor, with two bedrooms in the second story, a balcony, front veranda, and rear porch. It has an excellent cellar, with toilet, etc. These complete the appointments of "Tree Top," a cozy home among the trees, with the everchanging waters of the Sound directly in front of it.

our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

"WHITE ROCK," A COLONIAL COTTAGE AT GREENWICH, CONN.

ON page 51 we illustrate "White Rock." Owner, J. D. Sawyer; architect, E. E. Holman, 1020 Chestnut Street, Philadelphia, Pa. "White Rock" is a Colonial cottage with ten rooms and bath, with its lawn sloping down to the beach. Nearly half its frontage on the open Sound is taken up by white strata rock, contrasting strongly with the darker cliffs, an interesting geological formation, from whence its name is derived. It has an iron pier and a tramway arrangement for hauling small boats up on the beach. Directly in front of it, off the fishing rocks, most of its Sound frontage is a sandy bottom suitable for bathing; and within two hundred feet of the shore is an excellent anchorage for yachts, drawing nine or ten feet of water. In case of storms, a safe harbor is near at hand. An outside studio, and a stable, with three stalls and carriage-room, complete the outbuildings. The interior of "White Rock" is finished in Colonial style, with grille and column, wreath and flambeau decorations on mantel, wall, and staircase. The front door is a typical Colonial door, with side lights and shutters. Both dining-room and living-room open on the veranda through beveled plateglass French windows. A desirable feature is a double-doored closet between dining-room and kitchen, shelved and cupboarded. A cemented cellar contains a furnace, and the house is a winter as well as a summer residence. The first floor contains an entrance hall, living-room with fireplace, dining-room, and kitchen with set tubs; four bedrooms and bath on second floor, and two bedrooms and storage room on third floor.

Our illustrations were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

"FAIRVIEW," A COTTAGE AT GREENWICH, CONN.

ON page 51 we illustrate "Fairview." Owner, J. D. Sawyer; architect, E. E. Holman, 1020 Chestnut Street, Philadelphia, Pa. "Fairview" is a cottage of eight bedrooms, bath, entrance hall, living-room, dining-room, and kitchen, with veranda and three balconies and servants' porch. Close to the large rocks, that form its Sound frontage, few houses have a "fairer view" of the varying changes that Long Island Sound undergoes every day of the year. All the traffic up and down the Sound and the summer yacht racing are in plain sight from the veranda of "Fairview."

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

"HILL TOP," A RESIDENCE AT STAMFORD, CONN.

WE show on pages 55 and 56, in this issue, "Hill Top," a residence erected for G. Cadwalder Hammil, Esq., at Stamford, Conn. The house is treated in the Colonial style of architecture, is 50 x 110 feet, and the most pronounced features are the large stone chimneys and its seven gables. It is situated on the highest point on Palmer Hill, and with its extended view of the Sound is altogether charming. The architect was Mr. W. K. Benedict, of New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

Influence of Mediæval Masons' Work.

FROM the period when the constructors of the early Christian stone edifices raised their massive round pillars and solemn circular arches in the eleventh century down to the fifteenth, ecclesiastical architecture was the predominant art which absorbed all others, and made them either subservient instruments of its resplendent glory or humble imitators of its stately devices. It is a remarkable thing indeed—deserving of more attention from the curious and inquiring than it has ever, so far as we know, received—that everything ornamental, in whatever kind of work, within the period called the Dark Ages took its tone, and not only that, but its tangible form, from the ecclesiastical edifices of the day. In the decoration of churches it may be perhaps natural to find this peculiarity; yet it seems strange that wood should be carved into those forms which are necessary to meet the difficulty of creating lofty piles of stonework; and, taking analogy from other kinds of work, we would expect the stonecutter or statuary, who has a marble slab to deal with, rather to take advantage of his compact homogeneous material than to imitate all the shifts and peculiarities which the constructor has to adopt, who must fit one stone above another. Look, for instance, at the carved woodwork, so rich and varied, in the King's College Chapel of Aberdeen. All objects of art or of nature in all the material kingdoms were in the artist's choice to select from as objects of imitation, but his choice rests on architectural arcades, church windows and turrets. These representations are pleasing as imitations of architecture, but they are not the natural forms to which wood-carving would have adapted itself had there been no such architectural supremacy as we have alluded to, leading the ancillary occupation of the carver after it in its own exact footsteps. Nay, had there been no Gothic architecture to be so imitated, and had the handler of the chisel cut his wood from his own devices into such forms as these architectural ones which we so admire, they would not have been then admirable, because we would have been without a main element in the beauty of the original device—the adaptability to give to masonry lightness and elegance of form consistently with its retaining sufficient strength. The artist of the carved wood in this chapel has crowded it with representations of Gothic windows, many of them really exquisite ones, of that rich foreign style which the French call Flamboyant. But it is from our admiration of that skill which can make solid stone rise in slender mullions, and branch itself out as if in sheer beautiful wantonness into all airy and fantastic shapes, that we first acquire our admiration of the form, so as to be gratified by its repetition on a flat oaken board, where it takes its merit from the imitative rather than the inventive skill of the artist. But for a still more striking instance of the application of edile forms to carved ornaments we turn to that gorgeous tomb of Bishop Kennedy in St. Andrews. Here are abundance of tiny clustered pillars, with groined arches over them and multitudinous windows. The imitation is carried so far that we have not only little towers careering aloft, with windows in which the wooden blinds for shedding off the rain are imitated in stone, but, to keep all in harmony, in the lower department little circular flights of steps, destined, as it were, to be descended by elfin footsteps, lead to baby crypts.—The Architect and Contract Reporter.

Relation of the Engineer to Architecture.

FORMERLY the architect was his own engineer, and not always a good one, says The Inland Architect. This branch is not sufficiently emphasized in the architect's education, and some of the best architects call in the engineer when it comes to the practical work of engineering construction. The present tendency is toward a separation of the professions, the architect keeping strictly within the limits of his special training, and the engineer sticking closely to his figures. Yet there are not a few of the fraternity who believe that engineering is quite as properly a part of an architect's education as is drafting, and that the future will see some important additions to the curriculum in this respect in this country.

In the German technical schools they manage this matter quite differently. The architect is an engineer as well as a designer. He knows the strength of materials and the value of logarithms as thoroughly as his brother of the engineering school. He is not allowed to practice his profession without passing a rigid examination in the ordinary branches of an engineer's training. The result is that he becomes at the outset of his career an all-around man. Whether that fact tends to make him more or less successful as an architect we leave to the judgment of others. There is an opinion abroad that no man can have a too thorough training for his calling, and the tendency is toward enlarged rather than reduced courses in all the schools.

At least two instances of prominent Chicago architects who entered on a professional career as engineers might be adduced in this connection. These men found the drawing toward the artistic to be more powerful than the prosy pursuit of the practical, and they forsook engineering for architecture. Both have made noteworthy successes along the latter line, but both have been distinguished quite as much for their engineering as for their architectural skill. One is well known as the inventor of the steel-frame method of high-building construction, and the other is noted for his proven ability in solving great architectural problems where difficult engineering feats are prime factors. With both of these men the architect is great because he is preëminently an engineer.

Yet the average architect often fails to combine the two spheres of action successfully. The architect is essentially a planner, a seeker after a combination of utility and beauty—the best possible arrangement of an office building commercially considered, together with a pleasing exterior and a rich and impressive interior. He cannot always devote the needful time to the securing of all this, and at the same time immerse himself in the mass of figures and measurements that are essential to a safe and economical construction of the building from an engineering standpoint. So he associates with him in his work a practical engineer, evidently believing with our gallant Schley that "there is glory enough for all."

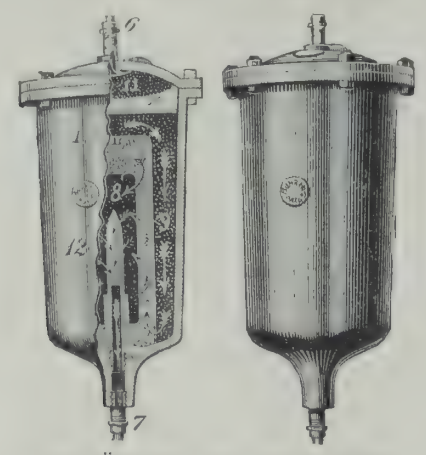
From foundation to roof the engineer must stand over the work almost literally day and night, rule and pencil in hand, to make sure that the eternal laws of physics are not violated, and that the mighty building shall not have been built in vain. His is a labor of vital importance.

THE BÜHRING WATER-PURIFIER.

Mr. C. Bühring, of Hamburg, Germany, was the first to conceive the idea of combining bone and wood carbon dust into the form and density of stone, without impairing the wonderful purifying properties of either substance. For thirty years the Bühring water-filter has held its own in the market. The method of obtaining an abundance of pure water by means of this carbon-stone and the skilful application of other scientific principles are the characteristic features of the purifier.

The severe tests to which the filter has been subjected during the long period in which it has been used fully justify the claims of the makers.

The filter fulfils in every important respect the requirement of improving the quality of a water supply. Water,



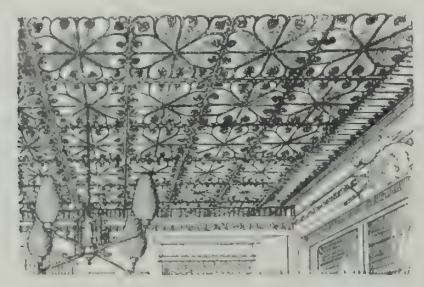
THE BÜHRING WATER-PURIFIER.

mingled with sewage, rendered almost opaque by the addition of a considerable quantity of clay (so finely divided as to remain in suspension for many hours), and mixed with sufficient sulphureted hydrogen to impart a powerful, offensive odor, was caused to run slowly through one of these filters. This experiment was remarkably successful. The filtered liquid was not only inoffensive, but perfectly free from any smell, either of sewage or sulphureted hydrogen.

A more exacting test of the filter's efficiency than this could scarcely have been applied.

The manufacturers of the purifier are the Bühring Water-Purifying Company, of 12 West Broadway, New York city.

The Berger Manufacturing Company, 210 East Twenty-third Street, New York, N. Y., are makers of all kinds of ceilings, side walls, wainscoting, etc. Until the introduction of Berger's classified designs, metal ceilings could not be obtained in complete and definite artistic styles. The decoration of ceilings is by no means of modern origin; but artistic metal ceilings in classified designs, with embossed moldings, borders, coves, miters, etc., are a twentieth century growth. Until Berger's classified designs were conceived, the decorative possibilities of the material were not understood or appreciated. Until then no manufacturer produced complete sets of plates in any of the different artistic styles. Another feature which has added to the metal ceiling's



popularity is its easy application to plastered ceilings and walls in need of repair, rendering them attractive at small cost. A striking example of the beautiful effect produced is given in our illustration.

Other incidental advantages aside from those named are readily shown in cases of urgent necessity, where country clubs, cottages, and summer residences are needed quickly for occupancy.

The Gothic style for churches marks a complete departure from anything heretofore produced in metal ceilings. The ornamentation is geometric, in open tracery. The background is of the irregular, stippled type, with stucco effect. Other designs which are shown are the Romanesque, Colonial, Empire, Italian, German, and French, Gothic, Roman, Greek, and Rococo.

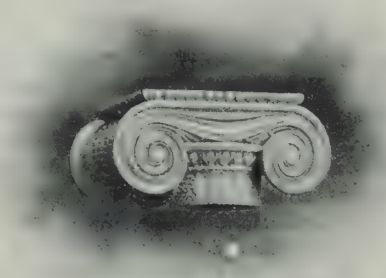
Color Tests with Building Stones.

Prof. W. B. Clark, Chief of the Maryland Geological Survey, has made an interesting report containing, among other things, some account of the building and decorative stones of the State, says The Builder. Many of the results of his work are of more than local interest, and the colored representations of marble, granite, and serpentine are the best we have seen in any work devoted to the subject. The tests made with the various stones included some investigations to ascertain the permanence of color. The specimens tested were rectangular in shape, and from 1 inch to 1½ inches in diameter. These were dried in a water-bath (at 212 degrees Fahrenheit) until all the absorbed moisture was expelled, afterwards being cooled and weighed. They were then placed upon a set of glass shelves standing in a porcelain pan containing strong hydrochloric acid. An open bottle containing nitric acid and one containing hydrochloric acid and black oxide of manganese were placed close by, and the whole covered by a bell glass, forming an air-tight chamber. After a period of seven weeks the stones were removed and washed, and the change in color, if any, was noted. We are not told what pains were taken to ascertain the exact shade of color of a specimen before being subjected to the test, so that it does not appear, at first sight, possible to trace faint changes in tint, if they existed, as a result of the treatment. Other tests had reference to corrosion of stones, resistance to abrasion, absorptive capacity, freezing, etc. Altogether, Professor Clark is to be congratulated on the results achieved.

A NEW FEATURE IN ARCHITECTURAL MODELING.

In lieu of cut stone, terra-cotta, marble, or metal for exterior and interior architectural modeling, Mr. Edwin D. Weary, of Chicago, has perfected a product which combines many valuable features. Upon a special composition of the nature of terra-cotta lumber, he has succeeded in depositing by an electro-galvanic process a shell of pure copper, from 1-16 to ⅛ of an inch in thickness. The base is hermetically sealed by the copper, is non-shrinkable, and absolutely fireproof. As the base is non-corrosive, there is no undermining of the shell by oxidation; and the shell, being of pure copper, the model is imperishable when exposed to the atmosphere or buried in the earth.

The effect is that of solid copper or bronze casting, except that the value and refinement of the original model is retained, and its artistic value even increased by the heavier deposit and granulation of parts in high



IONIC CAPITAL MODELED BY THE NEW METHOD.

relief. This accentuation is much in contrast to the effect produced by casting in molten metal or by compressing as in terra-cotta, whereby much of the sharpness of the model is destroyed. The deposit of copper can be controlled so as to produce a variety of surfaces, giving an egg-shell surface, a fine or coarse granulation, or serrated lines. The shell being of substantial thickness, can be polished or chased as desired. For exterior work it is usually left in its natural state, a salmon pink, which, by the action of the bibasic copper acetate, becomes a rich verd-antique. This finish is now much in vogue in hardware, and is very rich in appearance for architectural purposes. All forms of modelings can be put out in this form, and as the base material is originally in a plastic state, there is no limitation as to undercutting, without which architectural forms lose much of their value. The low cost, as compared with that of solid copper and the many other advantages, will appeal to architects and builders.

Advantage of Light Walls.

Aside from the question of beauty or the harmony of effect which we endeavor to secure in the selection of our wall coverings, there is a sound scientific reason in the selection of light colors and tints.

It has always been the aim and sometimes the problem of the architect to secure for the interior of a house all the light possible, and to utilize such materials as will best serve the reflection and even distribution of the light rays which enter through the windows or are produced by artificial lighting apparatus.

A recent article in the Pharmaceutical Era will serve to illustrate the point above advanced. The article says: "The lighting of a room depends, to a large extent, upon the color of the material of the walls; in other words, upon the percentage of light reflection by them. Recent experiments have shown the proportion of light reflected to be in percentages as follows: Black velvet, 0.4; black cloth, 1.2; black paper, 4.5; dark blue, 6.5; dark green, 10.1; light red, 16.2; dark yellow, 20; blue, 30; light yellow, 40; light green, 46.5; light orange, 54.8; white, 70; mirror, 92.3."

Thus it will be seen that, as we progress toward lighter shades, we ascend the scale of possible reflection, giving sound reason for the use of light shades of wall paper or the white of newly plastered walls.

Plan Preserver.

A correspondent on one of the English building papers presents the following suggestions for mounting plans on linen: Get a board or table sufficiently large to take the plan and tack the linen down with small tacks, of course minding that no creases occur in the linen. Procure some common flour, to which add the proper proportion of water, and then allow to boil in an ordinary saucepan until the required thickness is obtained. Then with a smooth paint brush besmear the linen evenly with the paste, taking care to remove all lumps from off the surface. Now lay the plans to be mounted carefully on the linen, and with a handkerchief or something of this sort, softly press the plan down to enable it to tightly adhere. After this put the board away for two days to allow the plan to dry, at the end of which time the plan will be ready for trimming off with a sharp penknife. I have done lots of plans in my time in this way, and find that not only is it cheaper, but the plans will last a lifetime.

LOGAN SANITARY STALL.

Inasmuch as a good horse, in the face of the keenest competition of the automobile, realizes a good price, and inasmuch as in the majority of cases the owner becomes endeared to his purchase, it naturally follows that every man who has the interest of his property at heart will look about him carefully for every means by which not only expense may be saved, but by which the health of his horse may be in every way preserved. In the year 1888, Mr. M. Logan, of the City of New York, obtained a patent for a sanitary stall. When it was first brought to the notice of the public, and the practical side of the question considered, Mr. Logan quickly observed that an improvement could be made, and in 1893 this improvement was effected. Again, seeing that it was not in every way perfect, an additional improvement was added, and in 1896 Letters Patent were again taken out, and to-day Logan's sanitary stall is beyond question not only the most simple, but the most humane device known to all who make such things a study.

In the first place, by its use there is so much saving as far as straw, blankets, etc., are concerned, that the stall will pay for itself in a very short period of time. Again, by its most perfect drainage and, as a consequence, lack of odor, the health of the animal is preserved. In a useful article, simplicity and lack of expense are necessary attributes to make it popular.

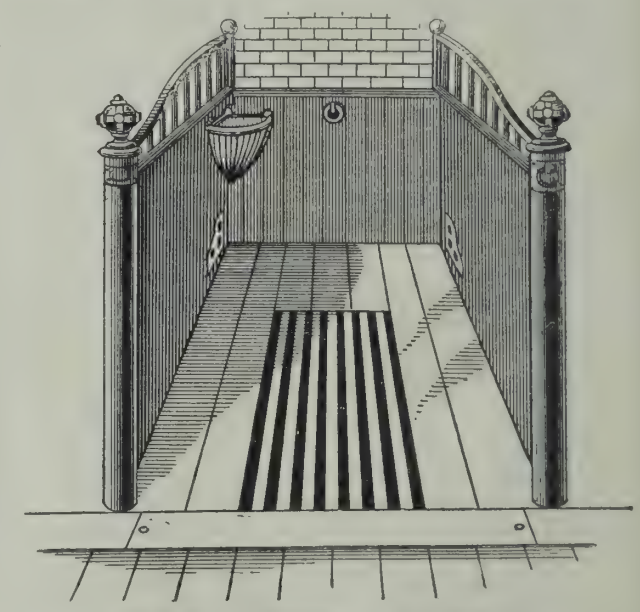
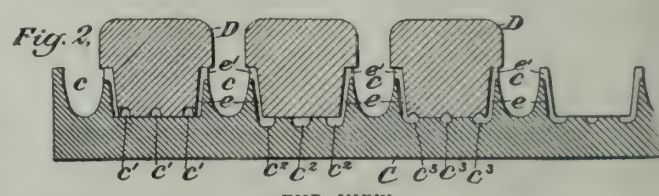
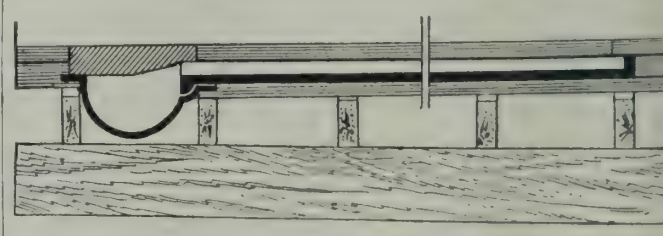


Fig. 2.



END VIEW.



LOGAN SANITARY STALL.

That Logan's sanitary stall possesses both of these is unquestioned, for it requires but little thought to place it in proper position, and the materials are of such a character, that they last really beyond their allotted time. In conclusion it is necessary only to say that the strongest proof of the popularity of the stall is the fact that at present it is in use by some of the largest owners in America.

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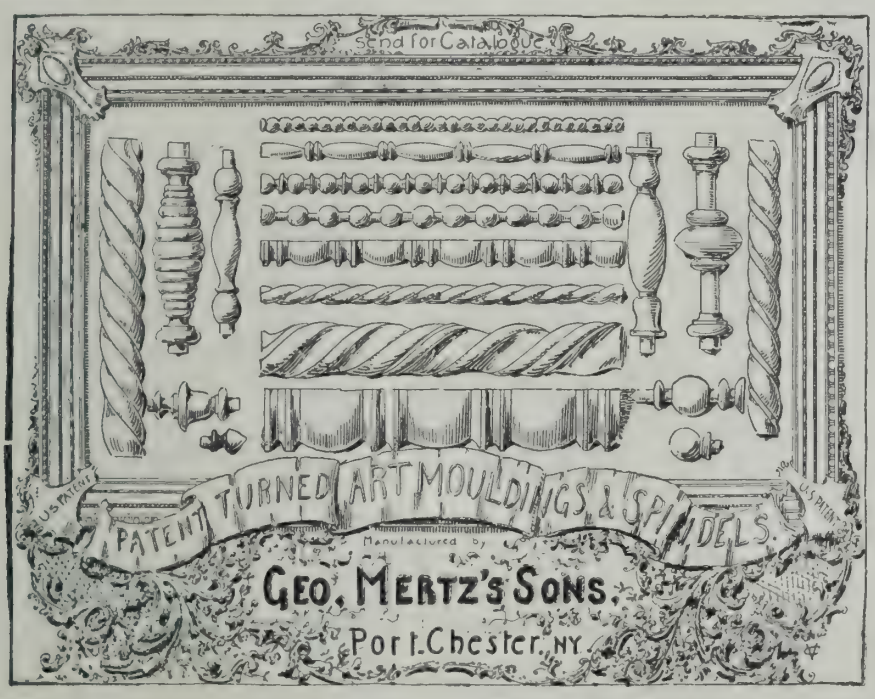

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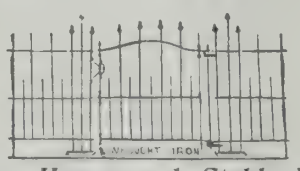

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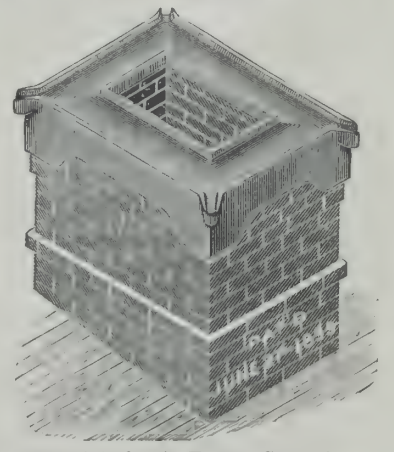

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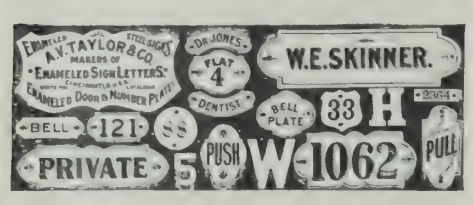

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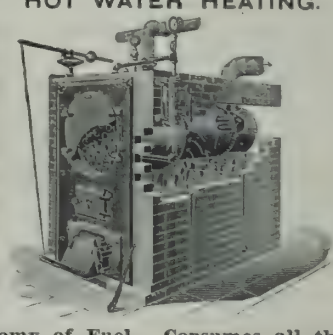

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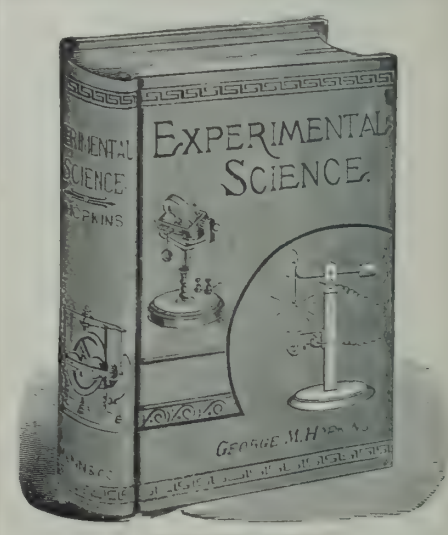

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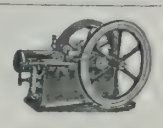

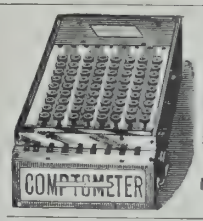

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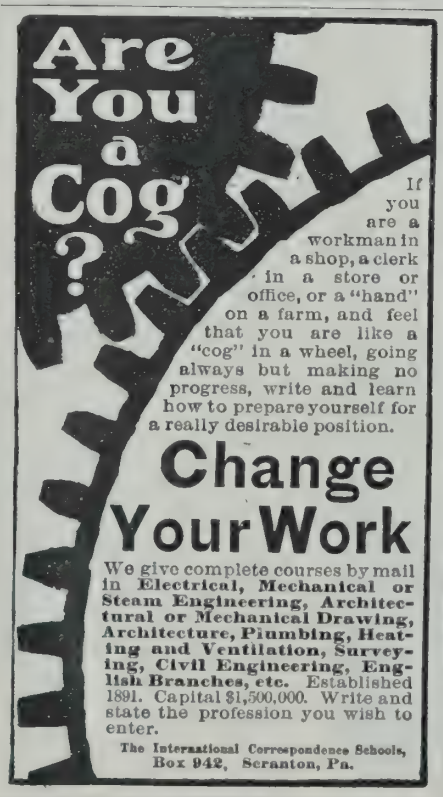

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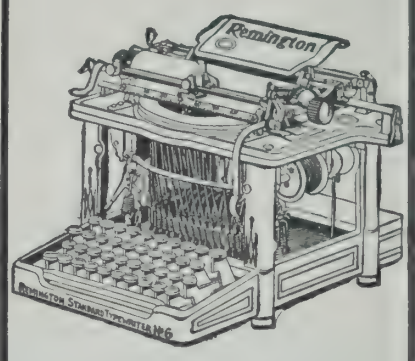

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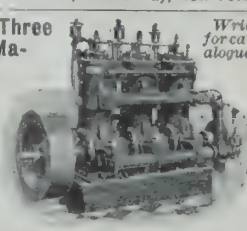

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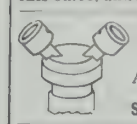

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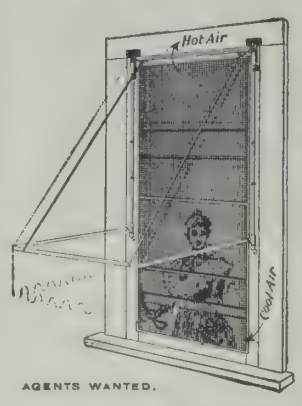

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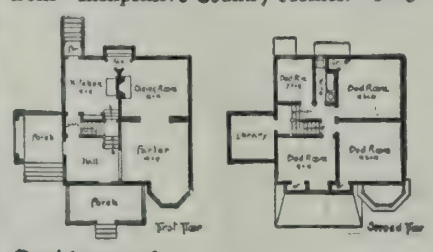

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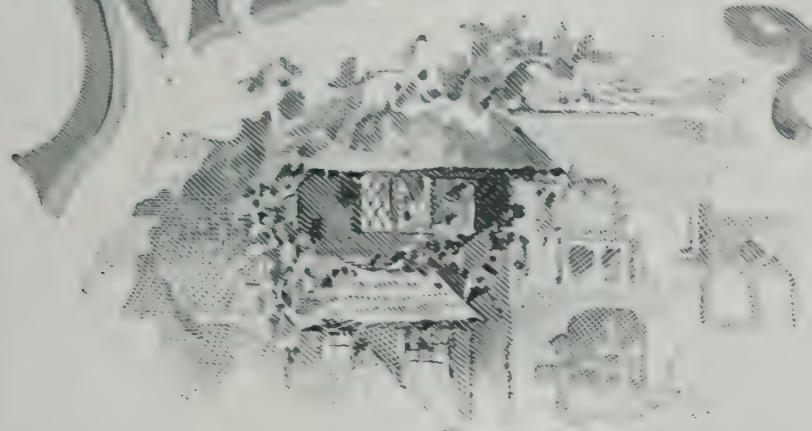

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VIEW OF DINING-HALL—A RESIDENCE AT ST. LOUIS, MO.—See page 77.

MESSRS. BARNETT, HAYNES & BARNETT, ARCHITECTS.

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A WORD FOR MUNICIPAL ART.

THE subject of municipal art is a most important one, and it seems as though each year more attention was being paid to it by art societies, and clubs which are interested in civic affairs. One of the best expositions of the subject appears in Municipal Affairs, which is issued by the Committee on City Affairs of the Reform Club of New York. It is appropriately named "The City Beautiful," and its 167 pages are filled with good things. One of the most interesting of the papers is "A Word for Municipal Art," by the painter and critic, Mr. Edwin Howland Blashfield, who asks, "What is municipal art? What can it do?" The reply to this question is another question: "What has it done?" And the answer, if developed, says Mr. Blashfield, would involve a story of art which should run parallel with the world's history from the Pyramids to the Dewey Arch. Municipal art has beautified and stimulated, and it has commemorated for more than 3,000 years. It made Athens the most famous city of antiquity; it made Rome the most splendid city of a splendid empire, a museum of art for all times; it has perpetuated the memory of the wise, and therefore stimulated millions of men to a thought of great examples. It has helped men to think, and municipal art is a public and municipal educator. It is, therefore, good, and we should have it. If we come from this high mission of art to a lower plane, we find that municipal art has swelled the revenues of the cities. The Ædile voting appropriations for art has been an unwitting speculator; his budgets' outgo has helped the budgets of the future; his buildings, his pictures, his monuments, had brought tourists by tens of thousands and have filled the pockets of the innkeepers The modest *albergo* of Milan or Florence has become the "grand hotel," advertising every convenience, and they send out a carefully selected list of the monuments of the town, those monuments which the aldermen, now hundreds of years dead, voted for with pride and great love of art, but with little thought that in the centuries to come they would constitute the city's best revenue and, as now and again in some Italian towns, yield a balance of trade. What would little Perugia be to-day without Perugino's pictured legacy, and what Assisi, Siena, Orvieto and Pisa, without their treasures of art? These cities sell lodging, meat, and drink, photographs, copies and tiny alabaster models to millions of outer barbarians. What a pleasure it is to see these little towns begin to thrive upon their art heritage, their heirlooms of temple, picture and statue! The innkeepers commence to improve the conditions of the local railways, to enlarge the hotels, to smarten up the shops, and at last they start real live industries, so that the independent Perugian or Orvietan stands again upon his own legs instead of upon the carved or painted legs of forefathers three centuries gone.

All classes took part in dowering the cities of old with art. Athens was the antique prototype. Rome, too, offered to the arts lavishly and unendingly, although somewhat pompously and officially. Art in Rome was a public functionary, respected but not loved quite so wisely as in Greece. The art of the Middle Ages was a devotee, cloistered with the monk, emancipated and aspirant with the mason in architecture, but in painting and sculpture still a novice, timid and stammering. With the Renaissance the republics came to the fore again, and Florence became the modern Athens. There the trades of the city, distinctly divided and classed, marched, each under its banner, to the building of a temple church, made it lovely with their carving, set about in their canopied niches the saints of each guild, Eli for the smiths, George for the armorers, and so on, until furriers and tanners, drapers and doctors, lawyers and carpenters hailed together the completion of their great votive church of Or San Michele, a fortress of the liberal arts, the symbol in stone of a triumphant, trading, fighting democracy. The art of Italy draws thousands of tourists annually, with millions of money, and some of that money, that which is dropped at the turnstiles of the museums, pays for the housing and keeping up of the treasures of art.

Paris is rich enough to forego this gate-money, and one passes no turnstile at the Louvre or Luxembourg. One is apt to think of Paris as the purveyor of easel pictures to the world, but one must not forget that she has not been unmindful of the larger art we call "municipal." Nor is she alone in this cultus of her best memories. Many a tiny continental city has honored its great dead and their great deeds with buildings so fine that they seem out of all proportion to the town's resources, until we stand, hat in hand, before such manifestation of the civic spirit. Young as America is, she is ripe already for a Walhalla of great men like that of Germany, a Walhalla where the Washingtons and Lincolns and Grants and Farraguts and Deweys, the Fultons and Morses and Fields and Edisons, the Longfellows and Emersons and Lowells, may stand or ride in bronze or marble; ripe, too, for a Pantheon such as that of Paris, where in a long series of great mural paintings, the lives of those who have most influenced the national sentiment are told to the millions who are their beneficiaries, and as the visitor is taught of the benefactors of France he understands the great inscription in letters of gold upon the pediment of the Pantheon, "A Grateful Country to its Great Men."

Our exchanges and custom houses are as worthy as those of France to chronicle the development of vast industries, to show upon painted vaulting and wall the different peoples of the world gathering at our summons to buy and sell with us. The Post Office of New York reaches its hand as far as that of Rome or Berlin, and has as much right to adorn its walls with the symbols, attributes and personages that collect together from the quarters of the earth and make up an epitomized pictured world's gazetteer. A post office, a railroad station, a bank, an exchange, any of these may offer an endless field to the imagination of the painter or sculptor. Still more suggestive are the library and courts of law, and think of a town hall where the whole expression of a people's aspirations may be pictured!

If a ghost could arise from some fifteenth-century tomb in a Florentine church, and could take a trip to New York, he would be surprised. "What!" he would say, "you tell me that those gigantic buildings, twice as high as our Giotto's bell tower and twenty times as big; you tell me that they were built by private enterprise, that they are for shops and offices! They are not at all unhandsome, but it is incredible that private citizens should have built such huge piles. And you mean to say to me that those little buildings down there in their shadow are the municipal buildings of the city? That little thing the City Hall? Incredible! Not but that it is a pretty enough building. Some of our good Florentine artists would not have been ashamed of it; but why in the name of all proportion and relation did you not put it to some minor use, and build a real town hall ten times as big, something suited to the metropolis whose very shops and offices climb upon each other's shoulders for 400 feet up in the air? Where does the public money go to? Why have you not cared to put it into beautiful public buildings? You cannot have had the plague very recently, at least, to discourage all enterprise, for your streets are full of healthy-looking people. You cannot be poor from civil wars, for your office buildings have no cannon or catapults on top (as had ours in Florence) to shoot at other office buildings. No, I cannot understand it. What have you done with your public money?" Well, we should have to reply, "We have great charities." "Hum," he would answer, "so had we, for that matter, in Florence. Our woolen guild built half the monuments of Florence and nearly paid for the cathedral. Our silk guild was the honorary holder of the keys of our baptistery. So the public money goes to the artisans and laborers. Then I will go to the quarter where they live, for there I shall find the lovely shrines at the street corners, the scores of sculptured fountains, the many colonnades under which the poor can sit at ease on Sundays and holidays and look at the statues and wall paintings about them. Yes, I will go the quarter of the laborers." Then that ghost would take a crosstown car with keen anticipation. We should take the car with him, but not with quite the same anticipation. After the ghost had hunted for the shrines and the fountains and found the corner groceries and the ash barrels, he would look really ugly. "Your laboring men eat meat three times a day, do they? Let me tell you that there was not one mechanic or shopman or workman in Florence who would not have been ashamed to eat meat three times a day in such a wilderness of brick and mortar hideousness as you have here. He would have one meal simpler and put the extra money into the building fund." "We have at least national patriotism," we should reply, and we should take him down to the Dewey Arch and tell him how the city had paid its money, how the artists had freely given their time, and how the millions came and applauded, and the spirit would applaud too, for this arch he would understand, and it would speak to him of such festivals as old Florence saw, and he would ask, "But how is it in this one spot of the great city such enthusiasm has found vent? What does it mean?" We should reply, "It means just as it meant with you—effort, perseverance, common action. It means, just as in your old Florence, homage to heroism, to discipline, to those who stood for each other and for the nation. Dear spirit, we do not lack the desire for beauty, but we are young, untried. When your artists raised arches for their festivals Florence was already nearly a thousand years old; we are but beginning. Good ghost, you rose too late to see our Court of Honor at the World's Fair. Come later still and you shall see its fruits. Creep back under your gravestone of the dim Florentine church; rest there for fifty years; or, if you are an unquiet spirit, come sooner—come in a quarter of a century—and you shall see."

Beauty in high places is what we want, beauty in our municipal buildings, our parks, squares, and courts; and we shall have a national school when—and not until when—art, like a new Petrarch, goes up to be crowned at the Capitol.

BUILDING IN SIAM.

THERE is a great amount of building going on in Bangkok at the present time, conservative estimate placing the number of permanent buildings that have been erected during the last year and are now in process of construction at 2,500, says Hamilton King, our Consul-General at Bangkok. These do not include the temporary structures of the natives, but represent all styles of more permanent buildings, from the rented shop and humble dwelling to the new palace at Tusit Park and the most pretentious modern dwelling house. The materials used in the construction of these buildings are wood, brick, corrugated iron, and tile. A few years ago teak wood was the most common building material, but the great advance in the price of teak has led to the importation of cheaper woods and an endeavor to obtain other lumber from the forests of Siam. As yet, there has been no good wood found to take the place of teak; for, in addition to durability and strength, this possesses the valuable quality of resisting the white ants better than other woods. Brick columns are now being used in the place of teak posts. While these are cheaper and furnish the strength needed, they are very clumsy in an otherwise lightly constructed building, and hence objectionable. It is believed that light iron girders and posts would find very general favor if once they were introduced. Several large fires have given rise to ordinances prohibiting "attap" (thatched) roofs or bamboo structures in the city in future. These circumstances, on the whole, have proved beneficial, for the city now rising is for a large part made up of brick, iron, and tile.

The sanitary department has also taken advantage of these fires to broaden the streets in the burned districts, so as to give room for sidewalks of brick and cement and open brick sewers between the sidewalks and the streets. These improvements are now being pushed beyond the confines of the burned districts; and the temporary structures that have encroached upon the streets, as time has gone by, are gradually giving way to sidewalks and sewers throughout the city.

In a city of from 500,000 to 1,000,000 inhabitants, rapidly increasing in size, and so scattered that it may well be called a city of magnificent distances, this great amount of building, these extensive improvements in walks and sewers, and the construction of new bridges in connection with the opening up of new streets, create a large demand upon the market. This demand promises to increase rather than diminish for some time to come; for, with all these new buildings in the city, rents are exceedingly high, and it is quite impossible for one to secure a comfortable tenement. Unimproved real estate is rapidly advancing in price, on account of the demand for new house lots; and the development by the King of Tusit Park, adjoining the city, is causing an extension of the streets, many of which are being paved with brick, that will take years for completion.

The city has been obliged to manufacture its own brick for a year or more. All the brickyards of the country turn out a coarse, rough product, so unsightly that it must always be covered up with plaster. Indeed, out of the great number of brick structures in Bangkok, I do not remember to have seen one that in America would be known by its exterior as a brick building.

Good clay is abundant, labor is cheap, and transportation by water is possible from every part of the country

and to every part of the city, through the numberless canals of this vast plain. The expense of fuel is the only thing that stands in the way of the cheap production of brick in the country. Good, smooth, common brick, pressed brick, cornice and decorative work, and good tile would appeal to the tastes of these people and would command a good price.

A very fair quality of lime is made from the limestone that is found in abundance along the shores of the Gulf of Siam, but the cement is all imported. The best cement comes from Denmark and England. American cement is unknown. One of the city engineers, qualified to speak, says that there ought to be a good market here for the second quality of Portland cement. The first quality sets too quickly, both for the work and for the workmen. Every enterprise must take into consideration the movements of the people, which are always deliberate. Unless care is taken in storing to keep it well covered and free from the ground, good cement is apt to harden if left in the package any length of time, on account of the great dampness of the climate. Corrugated iron is extensively used in the less pretentious buildings for roofing, and to some extent for siding. During the year 1897, there was imported of this material $73,756 Mexican ($35,992 in United States currency); and during the year 1898, $126,800 Mexican ($58,054). When one considers that there is far more building going on to-day than at any time during these two years, this will give some idea of the increasing demand for some durable, cheap building material. And yet this corrugated iron but very poorly supplies the want. As a covering for a building in this tropical climate, it is exceedingly hot; heavy for the light frames here used; hard to penetrate with nails; and, owing to the extended rainy season—from May to November—it lasts in good form for only about five years.

The most of this corrugated iron comes from Belgium; some of it from Germany. Although several attempts have been made to introduce American iron, it has not yet been able to compete with the European product, on account of the heavier freights of the longer haul. At present, this iron is bringing $10 Mexican ($4.64) a picul (133 pounds), and is rapidly advancing on account of a shortage in the Bangkok, Singapore, and Hongkong markets.

Any material that would furnish a light, cheap, noncombustible sheeting and roofing for buildings, such as might be termed temporary structures in America, would easily control the market here and displace the corrugated iron. If it can be easily penetrated by nails it will be a great merit; and the larger the sheets or squares the better it would serve the purpose. Such a material must be able to withstand the very sudden changes that occur in this climate, of drenching rains for hours, immediately followed by the intense heat of the tropical sun, without being water-soaked by the one or warped and curled by the other. It would seem that some of the various products containing asbestos that have recently been invented in the United States ought to meet this need. To introduce such an article, it would be necessary to demonstrate its merits by using it in the construction of one or two buildings, as actual acquaintance with the thing itself is necessary in order to introduce a new article into this market.

Building hardware is in large demand, and the American goods are held in much favor; but, on account of the upward tendency of our iron market and expense of freight, we are shut out by the European prices. Woodworking tools from the United States are much preferred to the cheap, clumsy articles that come from Germany; and, notwithstanding the higher prices, they are gradually winning their way. On the whole, however, Americans must be content to wait the appreciation of a good article that comes with a higher civilization before we will find much of a demand for our tools of the pattern and quality that are used at home. Something of an immediate trade in cabinetmakers' tools for working hard woods could no doubt be developed, if the trouble were taken to copy the tools that are already used by the cabinetmakers here.

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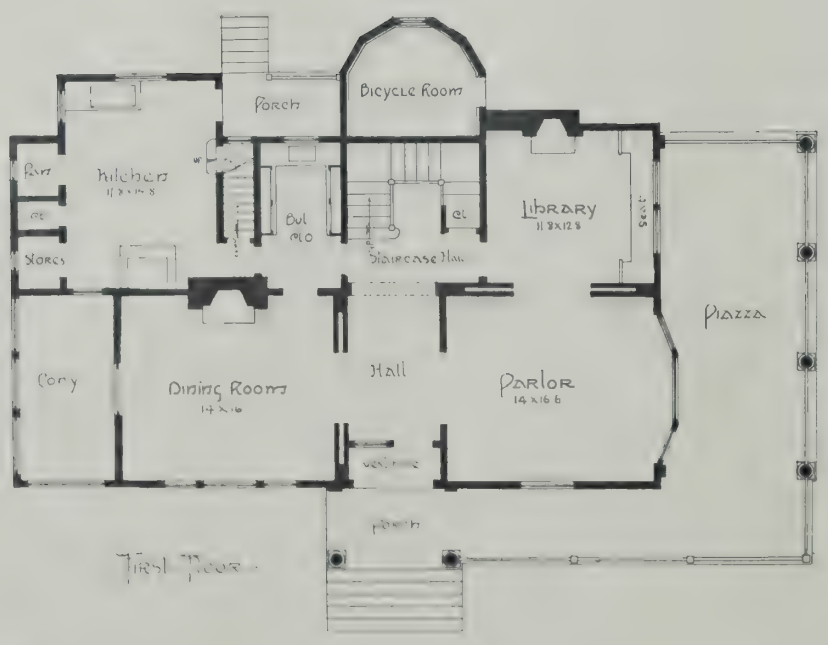
THE PROTECTION OF RURAL COMMUNITIES AGAINST NUISANCES.

A BILL has been prepared by a landscape architect for introduction into the State Legislature of New York which aims to suppress the practice so common in rural and suburban neighborhoods of disfiguring and injuring the trees, vegetation and public structures, such as bridges, by attaching to them signs and advertisements. Unfortunately many of the natural objects, such as rocks, are beautiful specimens, and the pleasure and relief which they afford to the eye and senses are entirely destroyed by bill posters and advertising sign painters. Local authorities have been negligent to this marring and deruralizing custom, but it is hoped that they will take an interest in such matters, as this will enhance the attractiveness of their own environment. The bill provides that it shall be unlawful to injure in any manner or to otherwise interfere with or destroy any tree or other vegetation ordinarily cultivated for ornamental purposes in or upon any highway, road, lane, etc., including banks and shores of streams, ponds and lakes, without the approval and consent of legally constituted authorities. A violation of the provision of the bill is to be punishable as a misdemeanor.

THE ARCHITECTURAL LEAGUE.

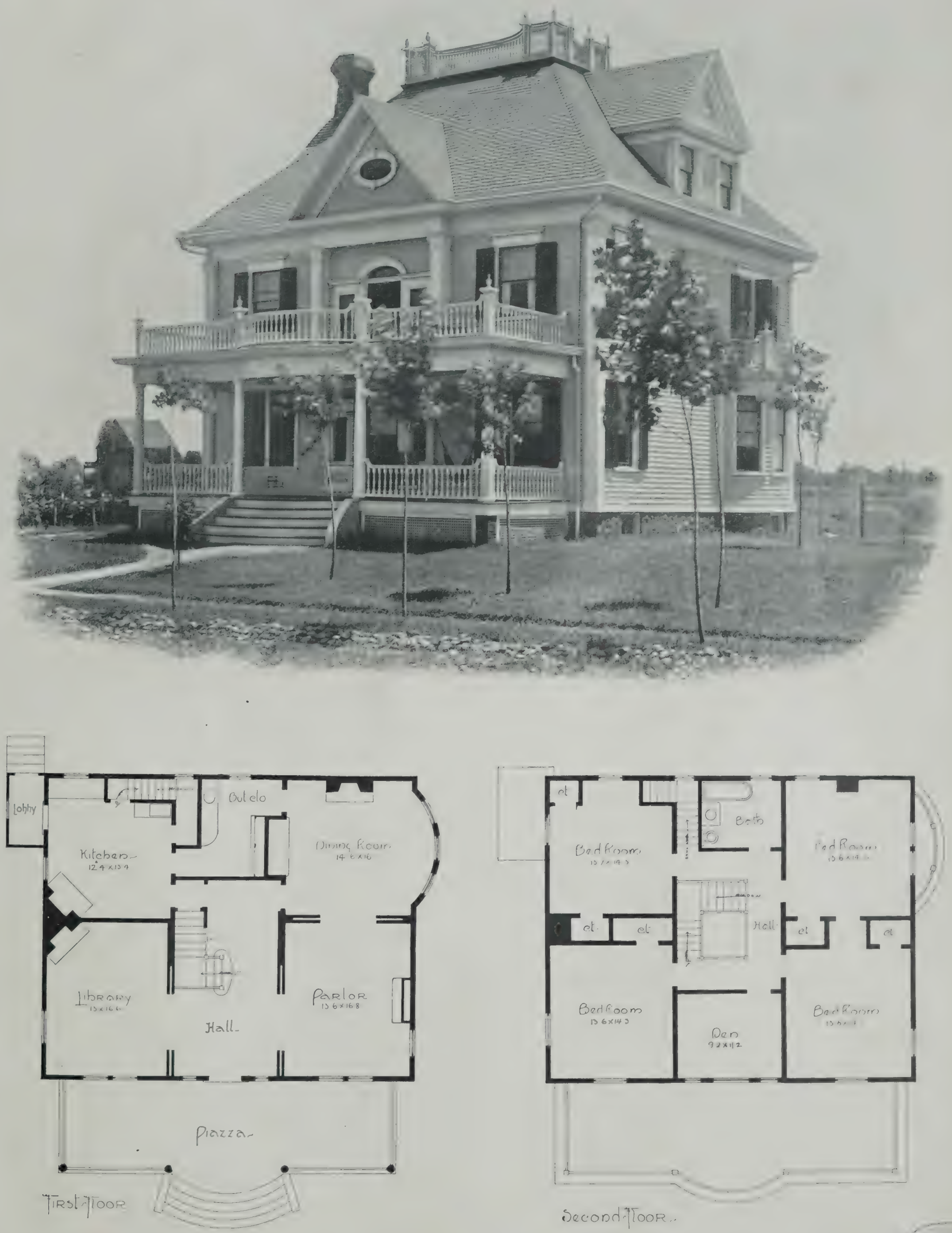
IN the March issue of the BUILDING EDITION we gave a general review of the exhibition of the Architectural League, and we now take pleasure in presenting engravings showing some of the interesting exhibits. The first gallery which is entered is termed the "Entrance Gallery," and is almost entirely given up to mural decorations, cartoons for glass, etc. The exhibition, on the whole, this year is most notable, but there are a few exhibits that should never have been permitted to be hung. Among the important examples of the work which is being done and which are shown in our engravings, is the large frieze over the doorway which represents a "Tournament at Camelot," by Richard Newton, Jr.; the large circular picture to the right is an angel executed by John Lafarge for the Church of St. Paul the Apostle. It was the center of much interest. To its right is a long frieze, but faintly shown in the photograph, representing Joan of Arc escorting Charles VII. into Rheims, by Joseph M. Jones, Jr. It is very light and attractive in color. The sculptured figure in the center is entitled "Trust in God," by F. E. Triebel, and the one on the left is entitled "Ascension of the Soul," by John Gelert. A special point has been made in this exhibition of sculpture which fills the center gallery. Our engraving shows one corner of the gallery. To the left is seen a baptismal font for the church of the Holy Trinity, executed by Isidore Konti. The small statuette next to it is Gutenberg, by Ralph B. Goddard. Next are four figures in the round, executed by Daniel Chester French for Cass Gilbert, and the decorative panel to be executed in marble at the right is by Augustus Lukeman. There are also many shields, panels, etc., which tend to show that American sculpture is in a healthy condition. "Applied" sculpture is extremely interesting, giving as it does great possibilities for growth.

A CANADIAN acetylene company has just put in a 300-light plant in a Canadian hotel, and a 380-light plant in a town in Manitoba. The new illuminant seems to be gaining great favor in Canada.



A RESIDENCE AT PLAINFIELD, N. J.—See page 76.

MR. EVARTS TRACY, ARCHITECT.



A MODERN COLONIAL HOUSE AT BAY RIDGE PARK, LONG ISLAND.—See page 77.

MR. HENRY E. HAUGAARD, ARCHITECT.

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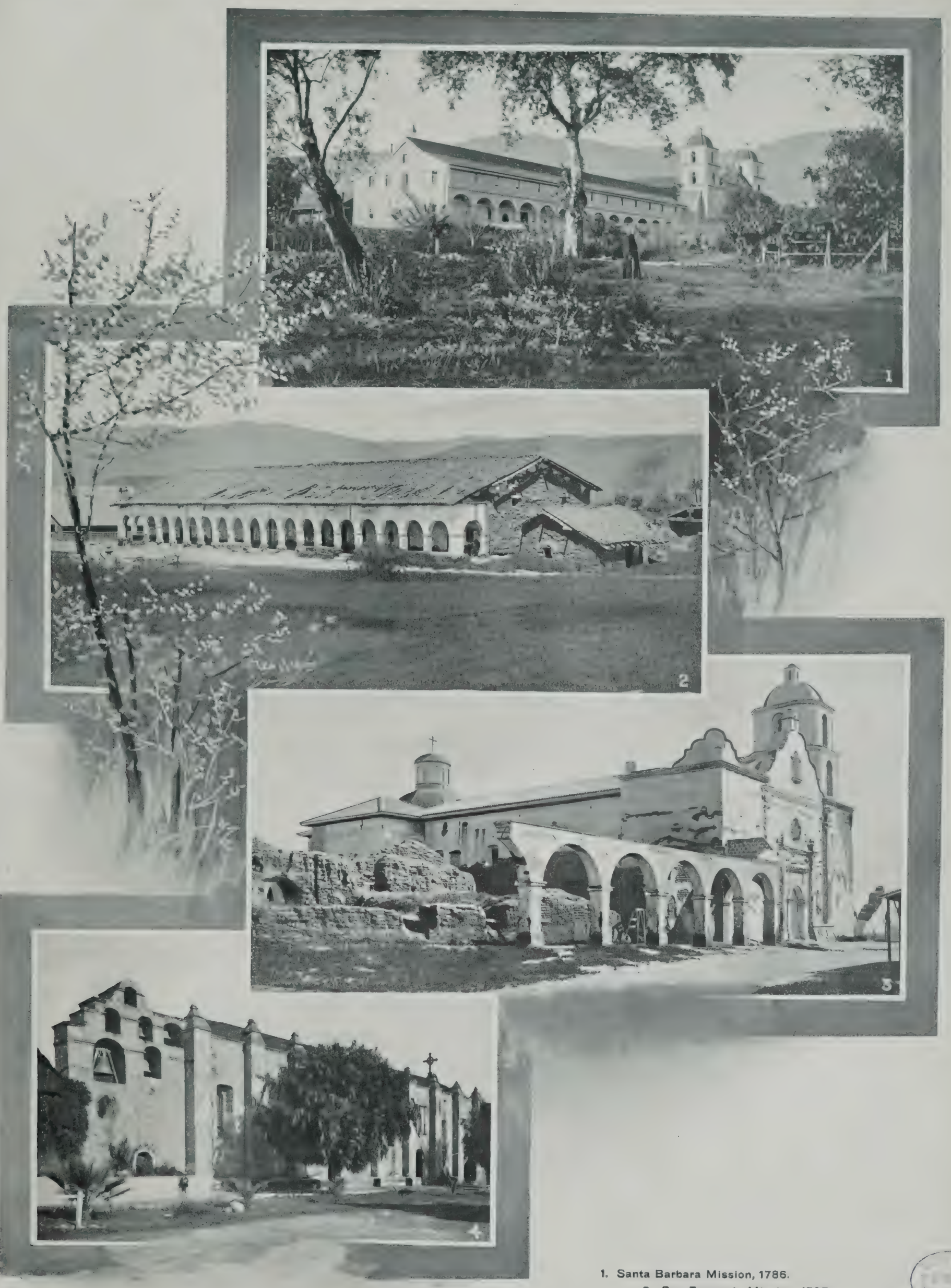
A MODERN RESIDENCE AT SPRINGFIELD, MASS.—See page 77.

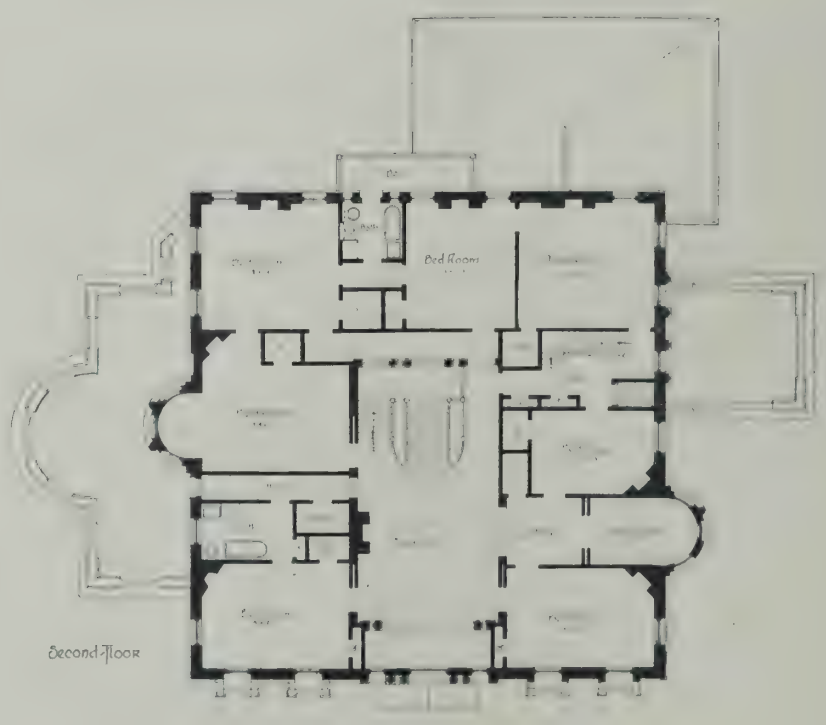
MESSRS. LOUIS F. NEWMAN AND CARROLL H. PRATT, ARCHITECTS.



1. Santa Barbara Mission, 1786.
2. San Fernando Mission, 1797.
3. Mission of San Luis Rey, 1798.
4. San Gabriel Mission, 1771.

THE OLD MISSIONS OF CALIFORNIA ON THE OLD KING'S HIGHWAY.—See page 76.

BY PROF. C. F. HOLDER, PASADENA, CAL.



A RESIDENCE AT ST. LOUIS, MO.—See page 77.

MESSRS. BARNETT, HAYNES & BARNETT, ARCHITECTS.

A RESIDENCE AT ST. LOUIS, MO.—See page 77.

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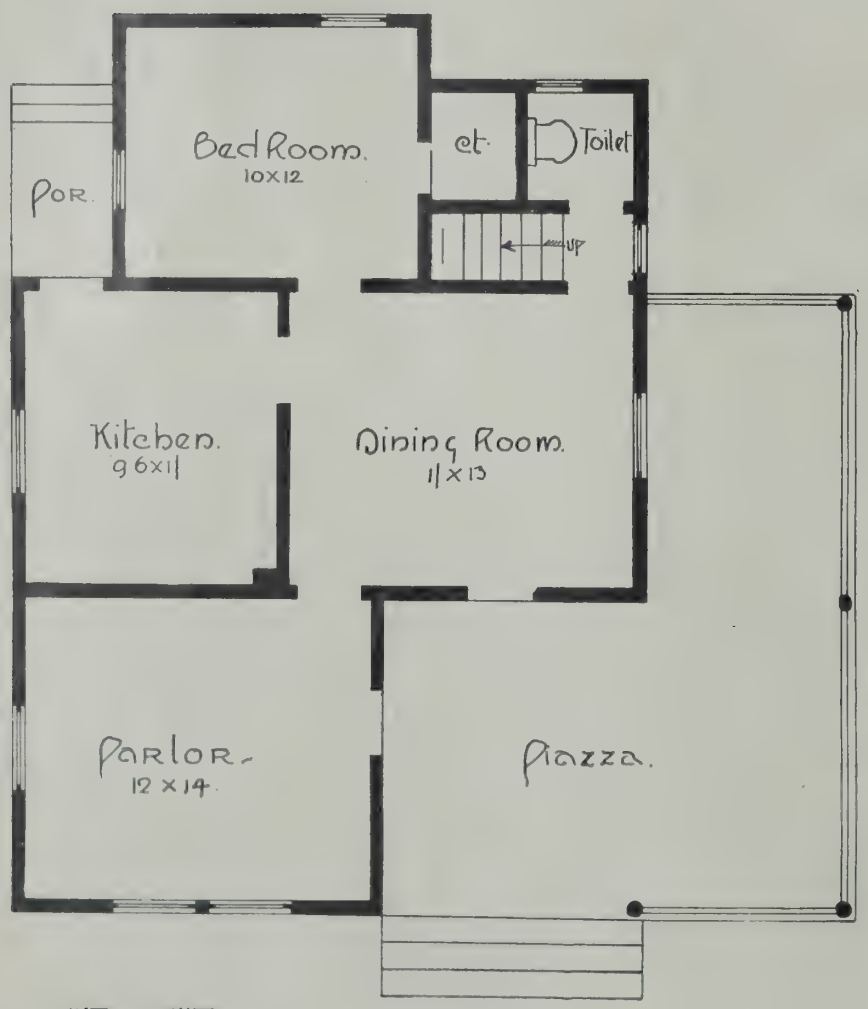
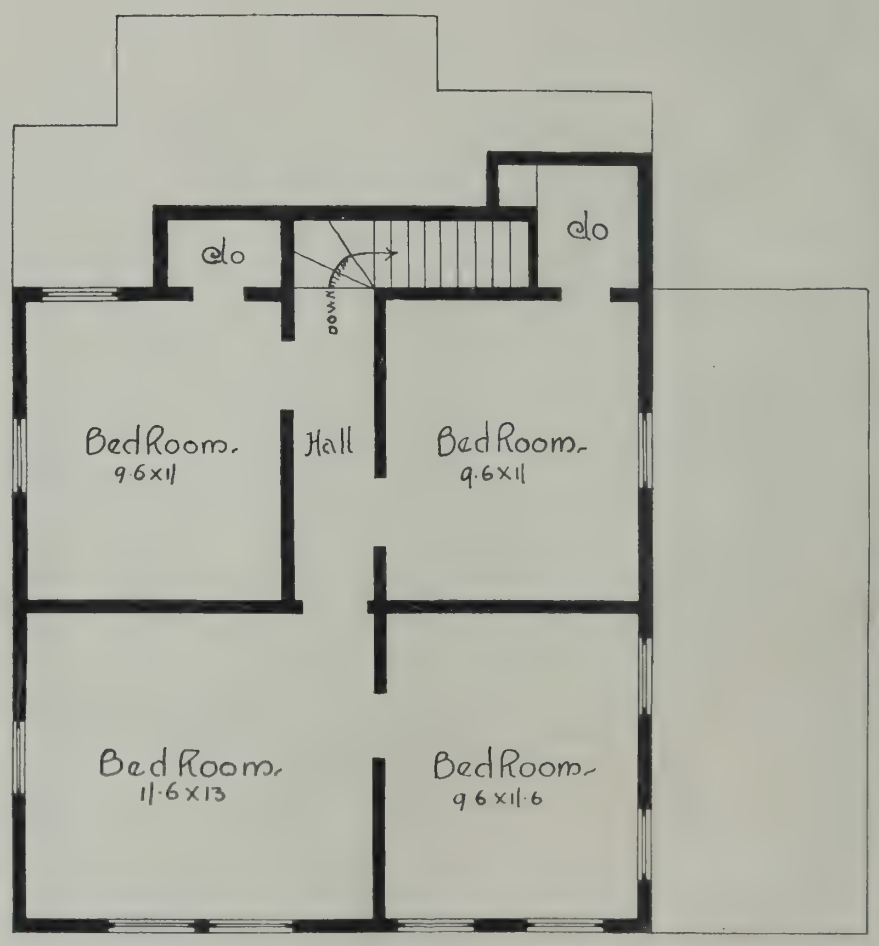


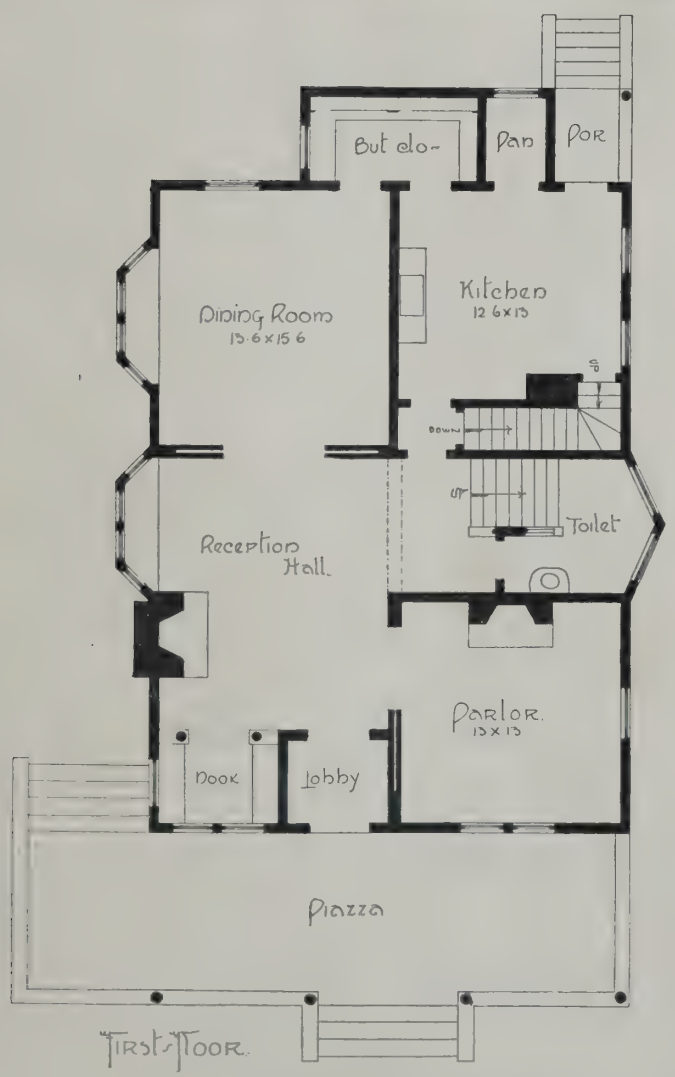
First Floor

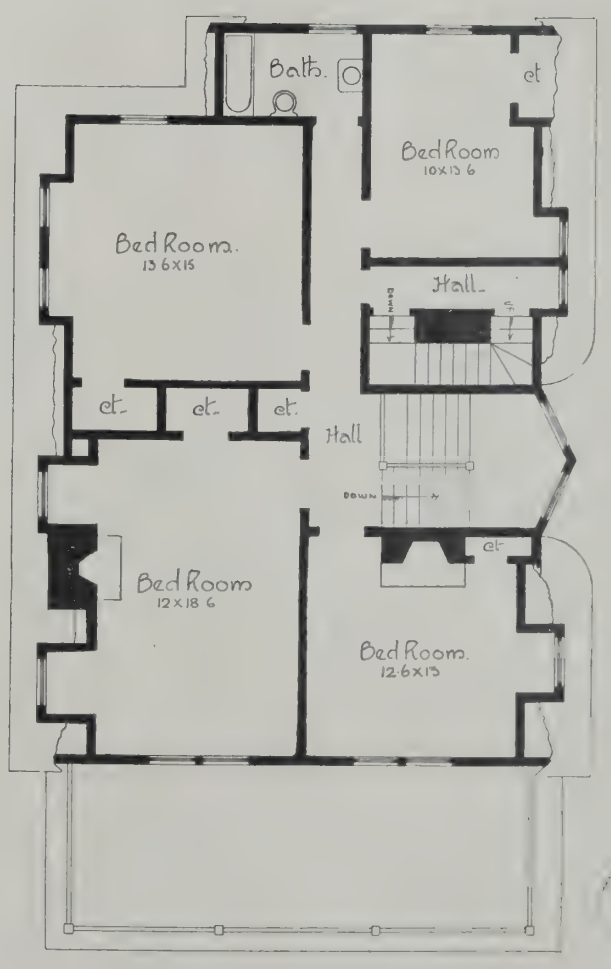


Second Floor.

A SEVEN-HUNDRED-DOLLAR COTTAGE AT MONROE PARK, SOUTH HAVEN, MICH.—See page 77.

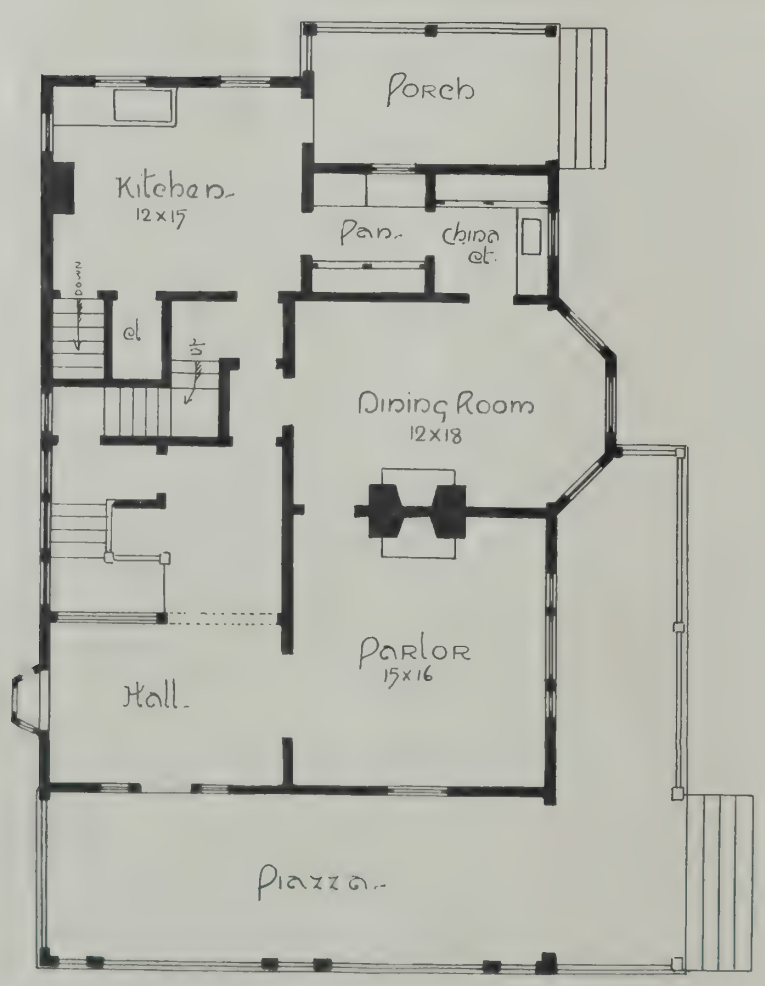
MR. A. M. WORTHINGTON, ARCHITECT.





A GAMBREL-ROOFED HOUSE AT SPRINGFIELD, MASS.—See page 77.

RESIDENCE OF MR. SPELLMAN.

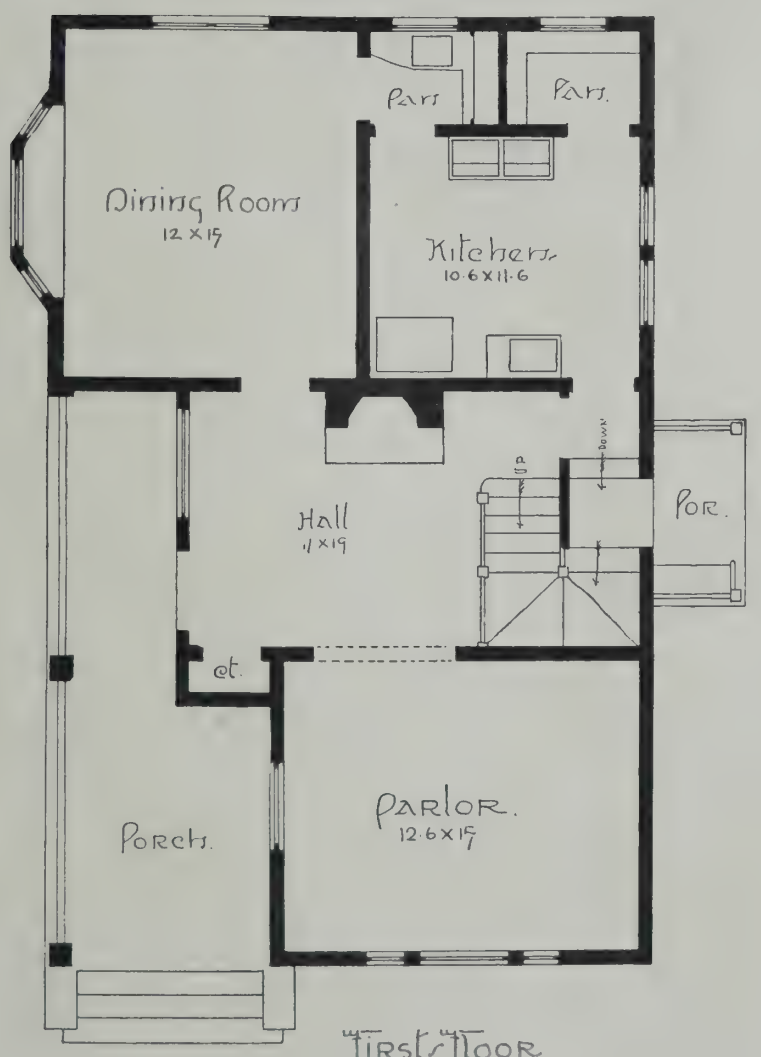


First Floor.

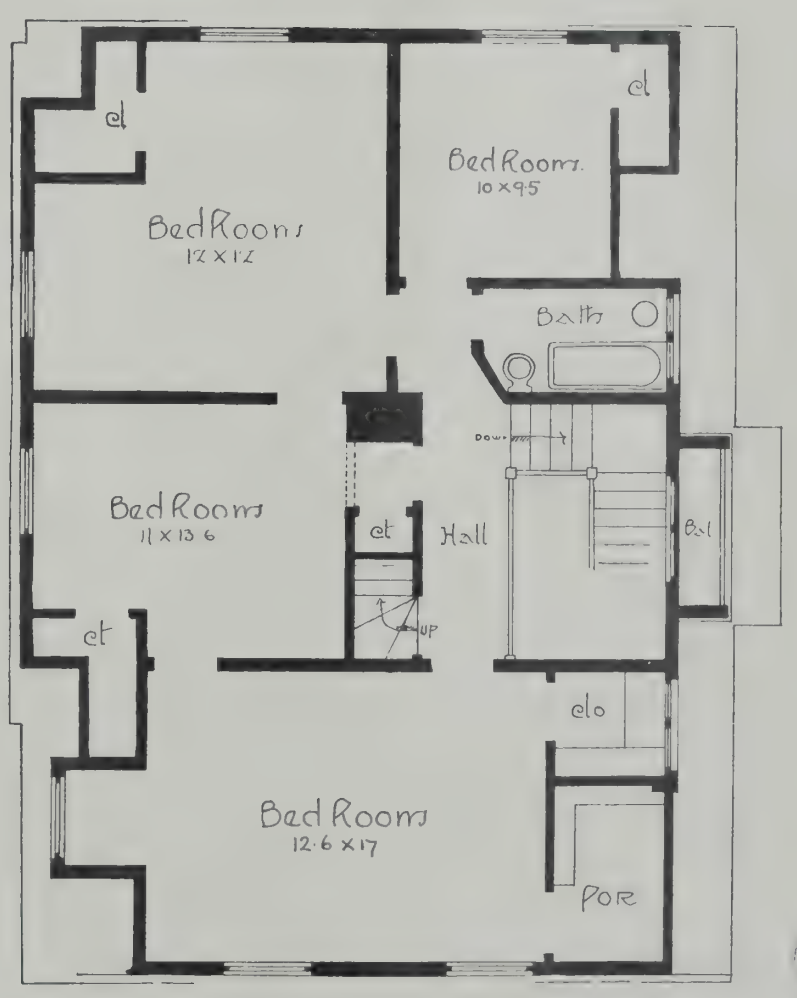
Second Floor.

A MODERN DWELLING AT SPRINGFIELD, MASS.—See page 77.

MR. LOUIS F. NEWMAN, ARCHITECT.



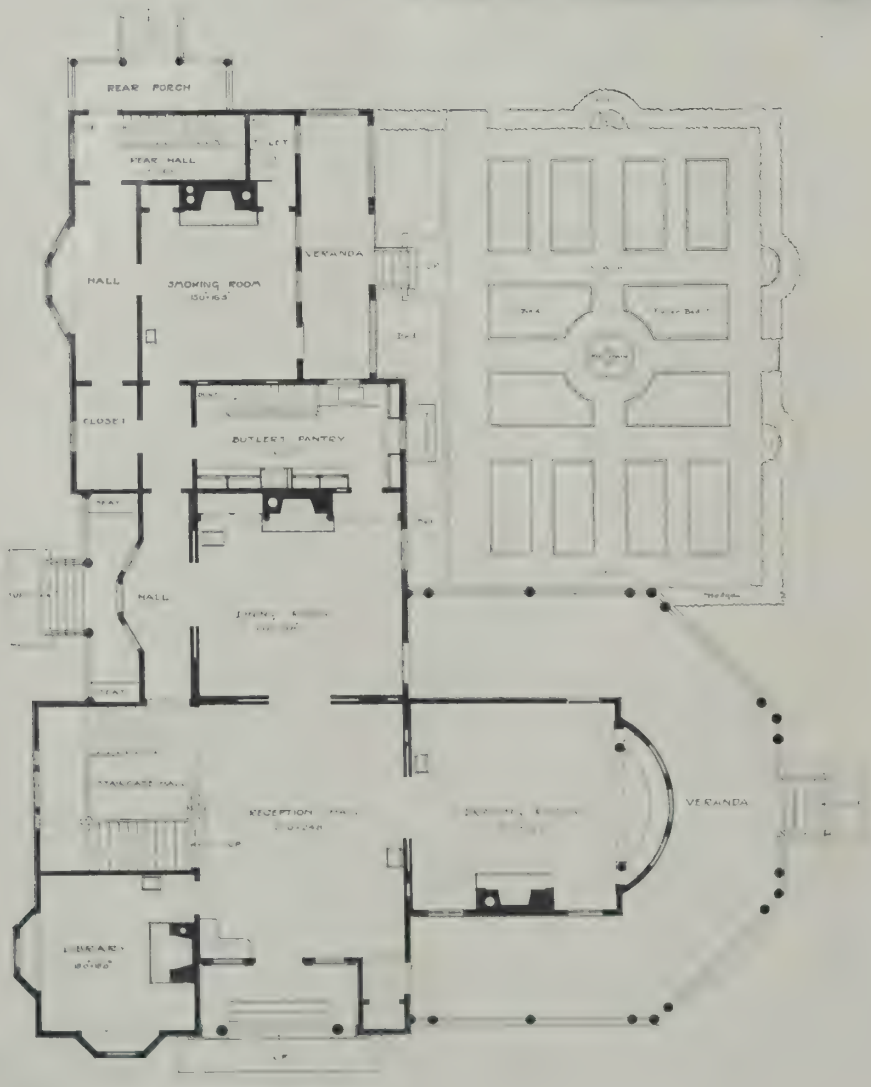
First Floor



Second Floor

A MODERN DWELLING AT PLAINFIELD, N. J.—See page 77.

MR. A. L. C. MARSH, ARCHITECT.



First Story

Second Story

A COLONIAL RESIDENCE AT MORRISTOWN, N. J.—See page 78.

MESSRS. JARDINE, KENT & JARDINE, ARCHITECTS.

A COLONIAL RESIDENCE AT MORRISTOWN, N. J.—See page 78.

MESSRS. JARDINE, KENT & JARDINE, ARCHITECTS.

THE OLD MISSIONS OF CALIFORNIA ON THE OLD KING'S HIGHWAY.

BY PROF. C. F. HOLDER, PASADENA, CAL.

In the California exhibit at the forthcoming Paris Exposition there will be a nook devoted to Southern California, and one of the interesting features will be the outlining of a plan which has already commended itself to the State, and which, in all probability, will ultimately become one of its attractions. It was conceived by Miss Picher, an art lover and honorary director of the Pasadena Art Loan Association, and, briefly, is the rehabilitation of the old King's Highway of Father Junipero Serra. It was the dream of this champion of the faith in California to see a chain of missions from San Diego to Monterey, a distance of about six hundred miles, and the ruins of these fine old buildings constitute one of the charms of travel in California to-day. They are so arranged that the traveler on the highway can reach a mission every night during the entire distance, and it is the object of the modern plan to revive the old road, plant it with double lines of palms, making one of the longest and best equipped roads ever contemplated, and one to rank with the great constructions of the day. The plan of the director has been to obtain the co-operation of the different towns along the route, and have each prepare the road and plant trees on the territory contiguous to it. Much interest has been enlisted, and in all probability the new King's Highway will become a fact. Local societies or branches are to be formed in various towns, each of which has some especial beauty or point of interest. Those on the line are San Diego, San Luis Rey, Oceanside, Escondido, San Juan Capistrano, Tustin, Orange, Santa Ana, Whittier, San Gabriel, Pasadena, Los Angeles, San Fernando, Ventura, Santa Barbara, Santa Ynez, San Luis Obispo, San Miguel, San Antonio, Monterey, Santa Cruz, San José, San Francisco. The ultimate scheme gives a bicycle or automobile roadway, lined with fan palms in three rows, from the mission of San Diego to the mission of Dolores in San Francisco.

The old mission buildings have in many instances fallen to decay, but within a few years this has been arrested through the efforts of the Landmarks Club of Southern California, which has accomplished excellent work in restoration along the exact lines of the original structures. Thus San Fernando, which was almost a complete ruin, has been re-roofed; so with San Juan Capistrano, and now it is proposed to arrest further decay at the old mission of San Diego. These old monuments of the adventurous Spaniard, and the religious zeal which served as an excuse for setting up the standard of Spain all along the western American coast, will make the new King's Highway, with its palm-lined sides, a delight to the lover of quaint architecture or of romance. The road now begins at the mission of San Diego, which was founded by Father Junipero Serra, July 16, 1769. The Carmino Real is, so far as the comfort of the traveler is concerned, complete at present, and the project has but to secure the planting of palms and the improvement of the road at various points.

Starting from San Diego, we leave one of the earliest of the missions of Southern California, that was built by Padre Junipero Serra, a man whose influence is still felt in California, and whose memory is revered by Protestants as well as Catholics. After many changes and trouble with the Indians the present mission was begun in 1776 and completed in 1784. This fell into ruins, and in 1813 another building replaced it, and it is the ruins of the latter which constitute the starting point of the Carmino Real or King's Highway of to-day. It is a pitiful ruin, but the old date palms tower high in air, telling the story of the last century. One can well tarry here and learn of the struggles and martyrdom of the old fathers. As late as 1827 this mission was a center of wealth. It owned 17,284 head of sheep, 9,120 cattle, 1,123 horses, and had a small army of native converts.

From here, when the East is covered with snow, we leave the old mission of San Diego and travel north along the coast, through a delightful country. The winter rains have brought summer verdure, and the rolling hills and ranges, the mesas and arroyos, are clothed in fresh greens and carpeted with flowers of every hue and description. Away to the east and southeast are lofty mountains and the continuation of the Sierra Madre, while to the west lies the blue Pacific. The road winds along, now skirting the ocean, again curving in among the hills, down through little oak and sycamore covered valleys. At night we find shelter, carrying out the idea of Carmino Real, at the fine old ruin of San Luis Rey de Francia, to the mind of the writer one of the most beautiful missions in California. Its long colonnade and fine arches are a delight to the eye. It was built in 1798 by Father Lasuen and Padres Santiago and Peyri. It stands in an isolated position in the center of a rich and beautiful country. If we had happened along the King's Highway a little sooner, say in 1827, we should have found, instead of a picturesque ruin, a principality, as here, as late as 1826, Father Peyri received into the Church 2,867 Indians. The mission was very wealthy, owning 20,000 head of cattle, 20,000 sheep, 200,000 acres of the richest land, where in one year were raised 3,000 bushels of wheat, 6,000 of barley, and 10,000 of corn.

We have not so far met an Indian on the highway, yet in 1834, after the secularization, this mission had a population of 35,000 Indians. The building was 160 feet long by 60 feet wide, 60 feet high; the walls four feet thick. A lofty tower held a chime of eight bells, and the fine corridor had 256 arches, many of which are still standing. While San Luis is still partly a ruin, we are welcomed by the Franciscan fathers who occupy the mission, and who, under Father O'Keefe, of Santa Barbara, are using it as of old. It was dedicated in 1893, the ceremonies being as near the original as they could be made; and what was particularly interesting was the presence of three Indian women who had heard the original dedicatory services by Padres Santiago and Peyri.

From San Luis Rey we ride down to the sea, skirting it for several miles, finally reaching the mouth of a well-wooded arroyo. Along this road, not so many years ago, the Spanish soldiers traveled with their leather armor and crude weapons. We can imagine the relief marching down to San Diego, when the Indians attacked the mission, and there was hardly a day but the King's Highway was used in the public service. Following up the arroyo, crossing and recrossing a little stream dignified by the name of river, about three miles from the sea, the four-in-hand rumbles into a little rambling town of adobes, with several small inns and a number of pretentious edifices, finding one of the finest ruins on the highway. Fourteen years ago, when the writer first saw it, this fascinating mission was still rapidly going to ruin, but the Landmarks Club has replaced the tiled roof and restored the old pile to such a condition that it will stand for years to come. We are comfortably housed at the Inn Mendelssohn, the genial proprietor a descendant of the famous composer. The first story is a store after the Mexican fashion, and above is the immaculate inn, where scores of distinguished travelers along the highway have been entertained during the past twenty years.

San Juan, while a ruin, is still in use, and a few of the faithful gather in one of the rooms which serves as a chapel. But what a strange contrast from the scenes enacted here at the beginning of the century! The mission was founded in 1776 by Fathers Serra and Mugartegui and Amurrio, a little party having been sent out from Monterey down the coast to make the selection of a location. The history of the mission is exceedingly interesting. In 1812 it was badly shattered by an earthquake, and the ruins of the roof where it fell are still shown. The great square surrounded by arches and corridors, the picturesque old chimney, the great chapel exposed to the elements, the quaint paintings and stations brought from Spain—all add to the interest of the remarkable old ruin that will always be a feature of the King's Highway. San Juan is about sixty miles from Los Angeles and San Gabriel, the latter being the next point of interest on El Carmino Real.

The old mission of San Gabriel Archangel was founded in 1771 by Fathers Cambon and Somera, who marched along the highway with a guard of Spanish soldiers from the San Diego mission, and after an examination of the country selected a location which is now marked by a small, crumbling heap, the church having been destroyed by an earthquake. In 1775 the present building was begun, being finished twenty-five years later. It was one of the richest of the missions, and over four thousand Indian neophytes were baptized here. The writer has examined the old books and found records in the handwriting of Serra and of Father José Maria Zalvidea. The building has not the architectural pretensions of the other missions; it is an oblong structure, pierced for a number of bells, but four being now in place. The interior has been restored and is in constant use. It is very crude, and the interior, with its whitewashed walls, its ancient books and paintings, its vestments in gold and silver, its tall candlesticks, all tell a vivid story of the times when the mission was the center of a vast municipality of the Church.

The highway from San Juan to San Gabriel leads through the mission hills near the town of Whittier, and the traveler now passes through the modern town of Pasadena, through the Canada Valley, on the very base of the Sierra Madre range, to the head of a large valley, where we find the fine old mission of San Fernando, which, thanks to the Landmarks Club, is now in a fairly good state of repair. This mission was the result of Father Serra's effort to continue and complete the chain of missions from one end of California to the other, and in riding along one cannot fail to observe that these missions are situated in the most fertile districts—in brief, are in commanding positions. Father Lasuen established himself here, and dedicated the mission to San Fernando, King of Spain, in 1797. In 1812 it was badly shaken by the earthquake of that year, but to-day presents an imposing appearance, and is one of the most picturesque ruins in America. It is now practically deserted, yet in 1820 it was the center of the granary of America. Enormous flocks of cattle, sheep, and horses roamed the fields, while the padres had in hand $50,000 in merchandise and $90,000 in gold. In 1846 the mission was sold by Pio Pico for $14,000 to raise money to fight the Americans. To-day it is a land of *dolce far niente;* a few Mexicans, a little American settlement, not far distant, are all that tell the story.

Leaving San Fernando the highway passes through an attractive valley, past the home of the Del Valles, Camulus, made famous by Helen Hunt in her story of Ramona. That night the wayfarer can make the mission of San Buenaventura by the sea, that at the time of its founding was in the heart of a densely populated Indian country. Father Serra importuned the powers that be for years before he succeeded in obtaining authority and funds for the erection of this small mission, which now stands on one of the main streets of the town of Ventura, and is in the best condition. In 1783 he was authorized to build this and the next mission south, thirty or forty miles beyond—the mission of Santa Barbara. From Ventura to Santa Barbara, from the top of a coach, one has delightful vistas of the ocean. The road skirts the sea, and in half a day's ride takes one to one of the most attractive old towns in California—Santa Barbara, with its background of mountains and its fine old mission building. This is to priest or layman one of the fascinating links in this chain, strung along the Californian coast by the great Franciscan, Junipero Serra, and it is still the abode of this order. The mission was begun by Padres Victoria and Rapoli in 1782, and finished in 1823. At that time there were 10,000 Indians in the vicinity. The mission is their monument, as the writer could not find an Indian in the country about, though the graveyard is filled with their remains, and their personal effects, mortars, and other stone implements are to be found in all the great museums of the world. One of the attractive features of this mission is the interior court, or garden, in which it is said but two women ever stepped, Princess Louise and the wife of ex-President Harrison. There is an air of sanctity and rest about the place that to many is its greatest charm. The tiled roofs, the sandaled-barefooted monks, the quaint pictures, the rich vestments, the long rows of arches, the artistic belfry, present a picture that recalls old Spain or Portugal.

The mission of Santa Barbara was one of the richest, and possessed thousands of head of cattle and large sums in coin. See illustrations on page 67.

Riding out of Santa Barbara to the north we pass El Patero, where has been found a vast burying-ground of the ancients. It has been estimated that scientific men uncovered the remains of no less than 10,000 Indians in their search for implements. Along this road, in 1804, Commandante Carrillo, with nine soldiers from the Santa Barbara Presidio and Padres José Calzada and José Gutierrez, marched to Santa Ynez and founded that mission which in the earthquake of 1812 was badly shattered. As late as 1831 the mission owned 20,000 cattle, 1,500 horses, and 10,000 sheep.

These disasters did not discourage the Franciscans. A new link was forged on the highway in 1797 by Padre Sitjar, on the Indian rancheria of Sagshpileel, and called San Miguel. Four years later four hundred Christianized Indians could have been seen working about the mission. In this vicinity the Indians formerly were very numerous. In 1771 the mission of San Antonio de Padua was established on the highway; La Purisima Concepcion in 1787, about forty miles from Santa Barbara. From here one journeyed on to San Carlos Borromeo at Monterey, founded in 1770; then to Santa Clara, near the flourishing city of San José. From here, by fine roads, the end of the chain is finally reached—the mission of San Francisco de Asi at San Francisco, founded in 1776.

It is interesting to note that an appeal made by Protestants in that city, in 1894, to save the old mission from ruin met with little or no response. The Landmarks Club, which is raising the means and stopping the work of destruction in the interest of history, is composed largely of Protestants, who have entered more enthusiastically into the work than the people who have every reason to be personally interested in the old piles along the highway built by the earnest and vigilant Franciscan fathers of the last century.

A RESIDENCE AT PLAINFIELD, N. J.

We present as our subject for color, and also on page 64 in this issue, a modern residence which has been erected for D. C. Ivins, Esq., at Plainfield, N. J. The building, though square in outline, is somewhat broken by bay windows and piazzas, thereby creating a most excellent combination of well arranged plans and attractive elevations. The underpinning is built of red brick, laid up in red mortar. The superstructure above is of wood, and it is covered on the exterior with sheathing, and then covered with paper and Southern white cedar shingles, left to weather-finish a silvery gray color. The trimmings are painted cream white. The roof is covered with similar shingles and stained a dark moss green. Dimensions: Front, 50 ft.; side, 35 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The interior is finished off in a handsome manner. The entrance is through a vestibule into an entrance hall, beyond which is the staircase hall and stairway to second floor. The trim in this hall, and throughout the house,

is of whitewood, and is painted old ivory white, except the dining-room, which is stained mahogany. The staircase hall is separated from hall proper by an archway, elliptical in shape. The former contains a very handsome staircase, with treads of white oak, balusters painted white, and rail of cherry. These stairs rise up to a broad landing, at the level of which is a den conveniently located and fitted up in a most complete manner. The parlor and library are separated by sliding doors. The former, of good dimensions, is treated in a dainty manner, while the latter contains an open fireplace built of brick, with hearth and facings of the same and a mantel of special design. There is also a paneled seat built across one end of room, which is an excellent feature. The dining-room, finished in mahogany, contains an open fireplace faced with old Delft tile brought from Holland, and also provided with mantel in harmony with the apartment. A conservatory also opens from the dining-room. The butler's pantry is unusually large, and is fitted up with butler's bowl, dressers, cupboards, etc. The kitchen and its apartments are fitted up complete in every respect. The second floor contains four large bedrooms, eight closets, and bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains three bedrooms and servants' bathroom, besides ample storage. A cemented cellar contains furnace, laundry, and other necessary apartments. Mr. Evarts Tracy, architect, 156 Fifth Avenue, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN COLONIAL HOUSE AT BAY RIDGE PARK, LONG ISLAND.

THE illustration shown on page 65 represents a modern house of Colonial treatment, which has been erected for the New York and Long Island Realty Company, at Bay Ridge Park, L. I. The design is attractive and pleasing, and it contains many excellent features. The underpinning is built of rock-faced bluestone. The superstructure is covered with sheathing, paper, and clapboards, and is then painted Colonial yellow, with ivory white trimmings. The roof is covered with shingles, and finished natural. Dimensions: Front, 33 ft.; side, 38 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third 8 ft. The interior arrangement is most excellent, and the rooms are finished off in a handsome manner, the first floor being trimmed with ash. The plan is arranged with a central hall, containing an ornamental staircase with newel posts and balusters. The parlor, of good dimensions, has a false fireplace with mantel of excellent design. The library has an open fireplace, with tiled facings and hearth and a mantel of hardwood. The dining-room has a similar fireplace, a swell bay window, and a buffet built in. The kitchen and pantries are trimmed and wainscoted, and are fitted up complete with the best modern fixtures. The second floor is trimmed with cypress, and it contains four bedrooms, closets, den, and bathroom; the latter is wainscoted, and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains servants' quarters and ample storage space. A cemented cellar contains furnace and other necessary rooms. Cost, $4,500, complete. Mr. Henry E. Haugaard, architect, Richmond Hill, L. I.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN RESIDENCE AT SPRINGFIELD, MASS.

WE present herewith on page 66, in this issue, a modern residence erected for Mr. Haskel Dodge, by the Forest Park Heights Land Company, at Springfield, Mass. The design is an attractive one. It has a pleasing roof with double gable ends, a chimney which is an architectural feature in itself, and a bay window with stained glass transom. The underpinning is built of red brick, laid in red mortar. The superstructure is covered with sheathing, paper, and then shingles stained a Van Dyke brown, while the trimmings are painted a cream white. The roof is shingled also and stained moss green with a mottled effect. Dimensions: Front, 27 ft. 8 in., with a 16-ft. extension at dining-room; side, 38 ft. 8 in., not including piazzas. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 2 in.; second, 8 ft. 10 in.; third, 8 ft. 6 in. The interior plan is arranged in a most excellent manner. The vestibule is paneled with oak, and it has a tiled floor. The main staircase hall is trimmed with quartered oak. It contains a nook with seat, a paneled divan, and an ornamental staircase turned out of oak, and provided with newel posts and spindle screen. The parlor is trimmed with whitewood, treated with white enamel. The sitting-room is trimmed with quartered oak, and it contains an open fireplace, with tiled hearth and facings and mantel. The dining-room, trimmed with whitewood, is treated with white enamel. It has a paneled wainscoting, at the top of which is a shelf studded with bronze tacks. The kitchen, pantries, and rear hall are trimmed and wainscoted with whitewood, finished natural. These apartments are furnished complete with the best modern fixtures. The floors are of oak and Georgia pine throughout. The second floor contains four bedrooms, large closets and bathroom. These bedrooms are finished in enamel paint and stainings. The bathroom is wainscoted, and is furnished with porcelain-lined tub and fixtures and open nickelplated plumbing. The third floor contains a hall and three bedrooms. There is a cemented cellar under the whole building, with laundry, steam heat, vegetable cellar, and the usual necessary rooms. Cost, $5,800, including steam heat and everything complete. Messrs. Louis Frank Newman and Carroll H. Pratt, architects, 21 Elm Street, Springfield, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT ST. LOUIS, MO.

WE present in this issue, on pages 61, 68, 69, a residence which has been erected for Baron S. Barnes, Esq., at St. Louis, Mo. The exterior is designed in the Italian Renaissance style of architecture, and is two stories in height, with roof. The entrance is embellished by a beautiful portico, with pediment; the architecture is elaborately carved, and gives a rich and prominent doorway. The triple window over entrance is handsomely carved and sculptured. The windows in second story are finely proportioned, and the stone balconies add greatly to the whole effect of the façade. The first story of the house is treated so as to give a rustic effect. The cornice is particularly chaste and beautiful in design. The whole appearance of the front is characteristic of dignity and repose. The terrace, with balustrade at front and the porch at side, is an attractive feature. The interior is laid out on the plan of a double house with a large central hall, with the various apartments on either side of hall proper. The entrance is through a vestibule, which has a mosaic floor, pink marble wainscot, and a domed ceiling in gold. The hall is treated in the Italian Renaissance style of architecture, and is trimmed with oak. The floor is of similar wood. It has a wainscoting 12 feet in height. The grand staircase, rising up in a central run, is treated in a magnificent manner. It has massive newel posts, exquisitely carved and furnished with candelabra. The open fireplace has facings and hearth of marble, and a mantel with columns handsomely carved. The drawing-room, or salon, is 20 feet wide and 40 feet long, and is separated in the centre by a column screen. This apartment is treated in the style of the later period of the First Empire, with ivory white and gold mountings. The massive open fireplaces have rare marble facings, mosaic-tiled hearths, and massive mantel rising up to ceiling. The grand dining-room, of large dimensions, is treated in the sixteenth century style, very elaborate and ornate. It is trimmed with mahogany. It is provided with a paneled wainscoting and a heavily-beamed ceiling. The buffet and china cabinet, built in alcove, is a magnificent piece of work, with its inlaid panels, etc. The fireplace, with tiled facings and hearth and mantel, is another very attractive feature. The library is trimmed with oak, and is finished off in the Italian Renaissance style. It has an open fireplace and mantel. The den is designed in the East Indian style and executed in teakwood. The breakfast-room is trimmed with oak and executed in the Italian Renaissance style. It contains an open fireplace and two china cabinets, built in either corner. The lavatory is conveniently located. The kitchen and its dependencies are most conveniently located, and are furnished with all the necessary improvements, and is trimmed with yellow pine. The second floor contains seven bedrooms, nursery, and two bathrooms. These rooms are trimmed with white mahogany, curly birch, curly maple, red mahogany, white maple, respectively, and each room is provided with ample, well fitted up closets. The bathrooms are wainscoted with marble, and the floors are laid with mosaic tile. The fixtures are of porcelain, with exposed nickelplated plumbing. All floors throughout are of polished hardwood. The third floor contains numerous apartments, besides servants' quarters and bath. A cellar contains the heating apparatus, laundry and all necessary apartments. Cost, $125,000, complete. Messrs. Barnett, Haynes & Barnett, architects, Columbia Building, Eighth and Locust Streets, St. Louis, Mo.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A SEVEN-HUNDRED-DOLLAR COTTAGE AT MONROE PARK, SOUTH HAVEN, MICH.

THE engraving shown on page 70, in this issue, illustrates a seven-hundred-dollar cottage which has been erected for Mr. L. S. Monroe, at Monroe Park, South Haven, Mich. This cottage was designed exclusively for a summer house. The underpinning is built of brick. The exterior is covered with sheathing, and then German clapboarding, painted fawn color, with white trimmings, sashes painted black. The roof is shingled and left to weather finish. Dimensions: Front, 24 ft.; side, 33 ft., not including piazza. Height of ceilings: first story, 9 ft.; second, 8 ft. The interior is not plastered; the walls and studding are dressed and are finished in their natural state. The first floor contains parlor, dining-room, kitchen, and bedroom, and the second floor contains four bedrooms. The whole is treated and finished in a first-class manner. Cost, $700, complete. Mr. A. M. Worthington, architect, Bellevue, Mich.

Our engraving was made from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A GAMBREL-ROOFED HOUSE AT SPRINGFIELD, MASS.

THE engraving presented on page 71, in this issue, illustrates a gambrel-roofed house which has been erected for Mr. Spellman, at Springfield, Mass. The design is attractive and pleasing, and it has a combination of well arranged plans and good elevations. The underpinning and chimneys are built of red brick, laid up in red mortar. The exterior throughout is sheathed, papered, and then covered with shingles and left to weather finish a natural silvery gray color, while the trimmings are painted light gray. Dimensions: Front, 32 ft.; side, 44 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The entrance is through a lobby, which is paneled in oak and provided with a tiled floor. The hall contains a pleasant nook with paneled seats, and it is separated from hall proper with a paneled base, from which rises columns to ceiling, supporting an archway with transoms. This hall is trimmed with quartered oak, and is fitted up with paneled wainscotings and ceiling beams. The fireplace is trimmed with tiled facings and hearth and a handsome hardwood mantel. The staircase is a broad, handsome one, recessed at side of hall, and provided with newels, balusters and rail. A bay window, glazed with leaded stained glass, is thrown out at the first landing. A lavatory is provided beneath stairway. The parlor is trimmed with pine, and is treated in white and gold. It contains an open fireplace, with tiled facings and hearth and mantel of Colonial design. The dining-room is trimmed with oak, and it has a paneled wainscoting and a beamed ceiling, and also a bay window thrown out at side. The kitchen and its dependencies are trimmed and wainscoted with hard pine and finished natural, and are furnished with the best modern fixtures complete. The second floor contains four bedrooms, large closets, and bathroom; the latter is wainscoted, and fitted up with porcelain fixtures and exposed plumbing. The third floor contains two bedrooms and ample storage space. A cemented cellar contains furnace, laundry, and other necessary apartments.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A MODERN DWELLING AT SPRINGFIELD, MASS.

WE present herewith in this issue, on page 72, a modern dwelling which has recently been completed for the Forest Park Heights Land Company, at Springfield, Mass. The design is attractive and pleasing, and it has many excellent features, while the plans are most excellently arranged. The underpinning is built of red brick, laid up in red mortar. The exterior above is sheathed, papered, and then shingled and stained a Van Dyke brown, while the trimmings are painted a buff color. The roof is shingled and stained red. Dimensions: Front, 33 ft.; side, 42 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior is trimmed throughout with whitewood. The hall contains an ornamental staircase, separated from the hall proper by columns rising to ceiling, and provided with spindle transoms. This hall has a small flower bay window thrown out at side. The parlor and dining-room, of good dimensions, are furnished with open fireplaces, provided with tiled hearth and facings, and mantels of excellent design. The kitchen and pantries are conveniently arranged, and furnished with all the necessary fixtures complete. The second story contains five bedrooms, with ample closets and bathroom; the latter wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains the servants' quarters and ample storage space. A cemented cellar contains furnace, laundry, and other necessary rooms. Mr. Louis F. Newman, architect, 21 Elm Street, Springfield, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN DWELLING AT PLAINFIELD, N. J.

WE present herewith, on page 73 in this issue, a modern dwelling which has recently been erected for Mr. George A. Bowman, at Plainfield, N. J. The exterior is treated in the gambrel roof order, and it has many excellent features, both exterior and interior. The underpinning is built of brick, laid up in red mortar. The exterior framework of wood is covered with sheathing, paper, and shingles, and stained a dark brown, while the trimmings are painted white. The roof is covered with shingles and left to weather finish. Dimensions: Front, 27 ft.; side, 40 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second,

8 ft. 6 in.; third, 8 ft. The building is planned to be built upon a town lot, and is so arranged as to give good light and ventilation and comfort to each apartment contained in the building. The trim throughout the interior is of white pine, treated with white enamel. The principal rooms have wood cornices, and the floors are of oak and highly polished. The main hall is an attractive apartment, containing an ornamental staircase with a dainty spindle baluster and newel treated in white, with mahogany rail. This hall also contains an open fireplace, with Tiffany brick facings and hearth and mantel of Colonial style, with mirror. The parlor is separated from hall by an archway, furnished with a spindle transom of ornamental style, and is treated in a dainty manner. The dining-room has a bay window, with a paneled seat, thrown out at one side of room. The kitchen, etc., are wainscoted and trimmed with white pine and finished natural. These apartments contain all the modern conveniences complete. The second floor contains four bedrooms and ample closets, besides a bathroom treated in white enamel and furnished with porcelain fixtures and exposed plumbing. The third floor contains one servant's bedroom and ample storage room. A cemented cellar contains furnace room and other necessary apartments. Mr A. L. C. Marsh, architect, 97 Nassau Street, New York.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A COLONIAL RESIDENCE AT MORRISTOWN, N. J.

The engravings shown on pages 74 and 75, in this issue, illustrate a residence of Colonial treatment erected for Miss E. S. Van Winkle, at Morristown, N. J. The design is admirable, and is treated in an excellent manner with Colonial detail and features. The underpinning is built of red brick laid up in white mortar. The superstructure above, of wood, is covered with sheathing, paper, and then clapboards. It is painted a light Colonial yellow, with white trimmings. The roof is covered with shingles and stained a dark green. The blinds are painted bottle green. Dimensions: Front, 63 ft.; side, 92 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 11 ft.; second, 9 ft.; third, 9 ft. The interior arrangement is most excellent and complete. The entrance is into a large reception hall, which is treated in ivory white. It has a wood cornice, and a grand staircase of excellent merit, separated from hall proper by a massive fluted column of the Ionic order, from which springs the spindle balustrade to stairway, rising up to a broad landing and then on to second and third floors. The drawing-room is treated in the Colonial style. It has a circular bay window thrown outside, with a separation provided with Ionic columns rising up and supporting a beamed arch. The fireplace is a broad, spacious one, with tiled facings and hearth, and a mantel handsomely carved and made from a special design. The very handsome crystal chandelier in drawing-room is worthy of mention. The dining-room is treated in the Colonial style in an effective manner. It has a paneled wainscoting, and an open fireplace, with tiled facings and hearth. The triple arches, supported upon Colonial columns, the center of one of which contains the open fireplace, is an excellent feature. The large butler's pantry is fitted up with cupboards, dressers, sink, and dumbwaiter, also stairway to basement. The entrance hall, rear hall, toilet, and smoking-room are conveniently located and are fitted up complete. The smoking-room has an open fireplace, furnished with tiled hearth and facings and mantel. The library is treated in white, and it contains fireplace, with the usual trimmings. The second floor is treated with enamel white throughout, and it contains a large open hall, seven bedrooms, linen closet, clothes closets, and bathroom. The bathroom has a tiled floor and wainscoting, and is furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains three bedrooms and ample storage. The basement, or cellar, contains laundry, furnace-room, and storage, besides, kitchen, pantry, and other necessary apartments. Messrs. Jardine, Kent & Jardine, architects, 1262 Broadway, New York.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

Dampness in Foundations.

A wall constructed of brick or stone of any quality whatever will be subject to the damp which exists in the soil, and which will enter in all directions and in all parts, where the wall is in immediate contact with the ground. The extent to which this damp will penetrate cannot be determined, and it may rise to a very great height above the level of the soil, and if it be arrested more or less, that will be caused by the influence of the neutralizing power of the temperature of the atmosphere; so that a wall which may be very damp at the beginning of summer will be much less so at the end of the dry season, and particularly so if immediately exposed to the sun, but the following winter the damp will return unless the original causes of humidity be subdued. It is desirable in all and every class of soil to have a substratum of concrete under the footings. For the purpose of damp this need not be very deep, perhaps not exceeding a foot high. As soon as the footings and lower part of the wall are carried as high as the level of the ground inside it will be well to introduce a thin sheet of lead the whole thickness of the wall, or a layer of bituminous substance as thin as possible, so as to penetrate the brick and stone and fill the pores, or a double course of thick slate set in cement. The purpose of the sheet of lead and of the bituminous substance and the slating, is to prevent the wet from rising up from the footings. But other precautions are necessary to prevent the access of damp from the surface of the ground next the outside face of the wall. A facing of stone is the best remedy. It need not be very thick, but it is well for it to be at least two or three feet high; and if a small interval between this facing slab and outside surface of the wall, so much the better, providing a circulation of air be kept up in the space. By this provision neither the rain beating against this part of the wall nor the water returning from the pavement or ground will be able to reach the main substance of the wall; for, although the facing slabs may be temporarily damped, they will soon be dried without communicating the damp to the body of the wall.

The inside of external walls should never have the plastering applied immediately on the face. They should be battened by means of long, narrow slips of wood attached by holdfasts to the inside face of the wall. These slips or battens receive the laths upon which the plastering is applied. The space formed by the battens between the wall and the lathing effectually keeps out the humidity. No impervious covering should be laid on wooden floors in the lowermost story, such as oilcloth, for instance; a certain moist air always rises from the ground and escapes through the joints of the boards, but if this be intercepted by an oilcloth, the air will rot the boards and oilcloth in a very few months. But it is important to keep the damp from the floors which come upon the ground, that is, the floors of the lowermost story. It is evident that the timber of stone slabs should not be in immediate contact with the soil. For this purpose let a stratum of concrete be laid over the whole surface of the house, six or nine inches thick at the least. Upon this form sleeper walls or piers up to the necessary height, and on them lay the plates or paving slabs. As an additional precaution, a thin sheet of lead might be laid under each pier on the bed of the sleeper walls. In palaces, as a greater precaution, and in buildings where expense is a secondary object, a thickness of asphalt might be laid on the concrete. In the dwellings of the poor it is expedient at all events to have the sleeper walls or piers, which need be only half brick wide and one course high, without the cement, and generally that will be a sufficient precaution. Where stone paving forms the floor, bricks must be laid under all the joints. Thus will the humidity be more or less prevented from reaching the floors. But of all precautions to prevent damp entering by the face of the wall, the best remedy is to have an area, which, by keeping the soil at a distance, precludes its fatal effects on the wall. These areas may be three or more feet wide, and may serve as a passage all round the building, and afford access to cellars outside, as in many houses; or if this, from want of space or the expense, be impracticable, it will be sufficient to have what are called blind areas, with convex walls against the earth, the points of contact with the outer wall of the house being as small as possible, to diminish the possibility of the communication of the damp.—The National Builder.

Papering Ceilings.

One of the supposedly most difficult parts of paperhanging, but which is really most easy of execution, is the papering of ceilings. After the art is once mastered the paperhanger would rather do ceiling work than any other.

The first step, of course, is to measure the length and width of the ceiling. As a rule, the paper should be hung across the room (with the width), and the first piece should be hung near the light. The paperhanger should only cut about two lengths of paper at a time when cutting for ceiling work, as owing to the great length of paper required to cover a ceiling in proportion to that required to cover a wall, it is apt to become damaged if allowed to drag about the floor while moving the scaffolding during the progress of the work.

In pasting these long lengths of ceiling paper it requires considerable skill to do so without tearing or otherwise hurting the paper. The best way to paste a long piece of paper is as follows: We will say that the paper is 14 ft. long and that the pasting table is 6 ft. long. Place the paper upon the table so that 4 ft. hang over each end of the board. After pasting the 6 ft. which is upon the table, pull the paper to the right, so that the 4 ft. on the left will be in position to be pasted. When this is pasted, it is then in order to fold part of the length, which is done by taking hold of the two corners of the end just pasted (on the left) and pulling the former 6 ft. which was first pasted back upon the table. Then the end of which you have hold should be quickly laid over until it reaches the end of the board, thus making a fold of 5 ft., leaving only 4 ft. to be pasted, which, when folded, will only be 2 ft. in length. This takes much longer to describe than it does in the actual work.

After it is properly folded as herein described, it should then be prepared for trimming. In trimming these pieces of paper which we have been using as an illustration, it will be necessary to make a double fold on one end, owing to the fact that when folded it measures 7 ft., while the board is only 6 ft. in length. This is very easily accomplished by simply carrying over the right-hand end about 2 ft. If the knife is properly sharpened upon the emery cloth it will not be difficult to cut through the four-ply which will necessarily result from this method of folding. The method of trimming for ceiling paper is the same as for wall paper.

Having satisfactorily folded and trimmed the paper, the paperhanger will proceed to hang it upon the ceiling in the following manner: Place the folded piece of paper upon the right arm, with the longest fold facing the body. Also have in the right hand a roll or half a roll of paper, so pasted on the end that it will not unravel while being used as a guide for hanging the paper. While thus equipped, and with the left hand disengaged, the paperhanger mounts the scaffold.

He then unfastens the end of the paper on the longest fold, and lays the whole length upon the plank (making sure that the latter is thoroughly cleaned before doing so), still keeping hold of the ends of the paper which he first unfastened. He then takes the roll of paper which he has in his right hand and places it under the length of paper as far from him as he can comfortably reach (about 3 ft.), and lifts the paper from the plank, with it guiding the paper, while at the same time holding it. (While this is going on the paperhanger has his back to the light.) The left hand fastens the paper in the corner of the ceiling at the left, and the right hand guides it to the edge of the wall with the half roll of paper.

When this is satisfactorily adjusted, the sweep brush or smoothing roller is taken from the apron pocket and smooths the paper onto the ceiling progressively, using the roll of paper before mentioned all the time as a guide until the second fold of paper is reached, when the left hand unfastens the fold; the paper is then brushed to the end. This procedure is followed to the end of the ceiling.

The greatest care is necessary to guide the paper straight, so that the pattern will match perfectly as well on the last piece as it did on the first.—The National Builder.

Municipal Laws in Relation to Architecture.

The question of municipal or governmental interference or control in matters of art and architecture is receiving serious consideration upon all sides—not only because of esthetic desires, but because it has become fairly apparent that there is a closer connection between the attractiveness of a city and its prosperity than has been previously acknowledged. The conditions seem to be coincident or at least supplementary to each other. Material prosperity is accompanied by civic pride, and the resultant embellishment of the city attracts in its turn and produces still greater prosperity. Under the conditions of the past, growth was gradual and changes intermittent, the fine arts developed progressively step by step, and while periods of apogee existed, both the rise and fall of each style or of each school was regular, consistent and localized. Limitations of space, of lack of intercourse and of transportation and consequent concentration of energy tended to individualize the art of each city, and to make it little subject to fickle variations—and each phase of art developed its own laws, which were the outgrowth of the local conditions, and which were either inapplicable or unsatisfactory elsewhere.

All this has been entirely changed, and modern conditions, under which art can develop, are so absolutely free and unfettered that there seems to be but little structure upon which an art can be raised. Let us compare, for instance, the achievement of any of the periods of great architecture up to the beginning of the present half century with the possibilities of the architecture of to-day. In most cases, religious observances, which were dogmatic in their requirements, set a style and method of construction from which a style formed. This in its turn was refined by successive generations, and took on such marked characteristics that any attempt at radical change was evidently no improvement, and variations caused by new requirements were so manifestly related to the parent style that any restraint excepting that of good taste seemed unnecessary.

The height of buildings was determined by the limit of man's desire to climb, the quality of design by the gradual inheritance of good taste born of constant association with true construction, simple forms, and refined expression. No restraint was put upon architectural expression, because it made a law unto itself, based upon direct traditionary descent of the arts. To-day all restraint is removed, traditions are unrespected and unconceived, construction is filled with new and experimental elements, and there is absolutely no limit to the possibilities of architectural development in every direction. The first impulse is to assume that such conditions are the most

advantageous possible, that they are stimulating, novel, and encouraging, and that the architecture of the future, the ideal, the masterful achievement will be produced by this liberty of action and abundance of material. But the fact remains that boundless horizons belittle whatever they surround, that unlimited possibilities paralyze action, and that the concentration of thought and effort of the past becomes a thin mist of diffused experiments when left to confront the possibilities of the present.

If, therefore, the very lack of restraint of to-day is a positive disadvantage in the development of good architecture in our cities, is it not a rational consequence that we should apply certain laws which would minimize eccentricity, and as far as possible prevent incongruity in our city architecture? And if so, what shall be the character of such laws and upon what shall they be based? Any coercion in the matter of styles or character of building is manifestly unjustifiable and of no value. Any and all styles of architecture can be made harmonious. Any regulation of methods of construction other than that they shall be secure is equally unjust. All limitations as to kind of material would be merely autocratic and unreasonable. There remain, then, two factors in architecture or in building, upon one or both of which these controlling laws should be built—first, possible injury to neighboring estates; second, injury to general or public welfare. As to an appeal to public taste, it is of little value, as has been abundantly proved when such taste has been uninfluenced by the environment of works of art by great masters. All education must begin with the few and be taken up by the many.

In all matters of material welfare, the material relations of neighbors is carefully considered and each is protected —encroachment or injury of any kind being rigorously punished—but it is acknowledgedly difficult to always define where material conditions cease. Is disproportion and incongruity of design no material injury? and, even more, is excessive height and consequent shade no material injury? In the latter case, such statistics as exist proclaim actual though indefinite injury, while in the former it is none the less actual but incapable of proof. As to the matter of still greater importance—the general welfare of a city—it is apparent that the beauty of a city is a marked pecuniary asset. One has only to realize the vast amounts of money spent by the traveling public to appreciate the fact that the public goes where it will find the fine arts at their best.

Consideration of controlling laws in the matter of architecture is therefore of selfish expediency, if all nobler arguments fail—both to the individual and to the public at large. In order to determine the exact character of such laws, we must first establish the injuries which occur from their lack, and compare various local conditions for suggestions as to methods of procedure in each case.

Laws governing the erection of buildings in relation to their architectural effect are existent and recognized in European cities, and have been in force in France for over one hundred years. In each case, new laws have been enacted at the time of a marked change in the government, thus indicating a general interest in such matters and a desire on the part of each new power to improve upon the acts of its predecessors. These laws are mainly of two kinds: First, those relating to the height of buildings; second, those relating to the size of interior courts. Both are primarily laws compelling sufficient light and air, and enacted ostensibly, and possibly actually, for sanitary reasons, and forced upon European cities by repeated difficulties in stamping out disease and in keeping streets dry and clean. But—and this is of interest—both sets of laws have immediately tended to beautify the cities, the first by preventing great incongruities of skylines, the second by compelling broad façades. This latter requires a little explanation. In European cities—Paris, for instance—the height of walls is proportional up to a certain point (say twenty meters) to the width of the street or court upon which they occur; an interior wall, therefore, to be of any considerable height, must be upon a good-sized court, which, in its turn, requires a building of ample width and therefore of broad façade. These laws in regard to courts are in force in Berlin, Dresden, Vienna, Budapest, Paris and elsewhere.

In London, however, the laws are somewhat different. There, as in American cities, there are streets of small individual holdings, and there is much less living in apartments than upon the Continent. Such streets are necessarily a succession of narrow fronts, each of which the occupant desires to make as individual as possible. The effect is necessarily of a harlequin order of architecture. The same difficulty is to be found in each of our American cities. In London, at the time of Nash, there was an attempt made to unite these various fronts into one long façade, but the persistent individuality appeared in variously colored doors and shutters and different shades of paint.

The apartment house, on the other hand, while distinctly more effective than the united house fronts, has many practical disadvantages. The very gregariousness of the occupants of apartment houses leads to dangers from diseases, etc., from which the small house occupant is free. And it is doubtful if the English-speaking peoples will ever abandon their own small castles. Still, the value of land in the centers of large cities tends to the amalgamation of small holdings and the erection of large buildings, and therefore the European laws, both in regard to height of buildings and to courts, are applicable to the centers of all large American cities.

There is a minor set of laws which, while seemingly slight, have done much to enhance the beauty of Paris, and each of these has as its motive a desire for improvement in appearance. First, no signs are allowed, excepting of gold skeleton letters, above the ground floor, and therefore all architectural lines are undisturbed. Second, no chimneys shall set on front wall, nor on party or side walls within a given number of feet of front wall; this insures integrity of skyline of cornice. Third, cornice and belt lines in same block shall be made to harmonize, producing a larger effect of mass and scale than would occur with adjacent unrelated façades, however long.

It will be noticed that these laws are either caused by sanitary requirements, in which case it would be suicidal to oppose them, or they are of so apparently slight a nature that it does not seem worth while to make objections to them, yet their effect has been very remarkable upon the architecture of European cities.

As to specific laws in regard to the height of buildings, they must necessarily be influenced by local conditions. For instance, in a city restricted from expansion in all directions but one, as in New York, high buildings are more justifiable than elsewhere—but there is a reasonable limit which is finally determined by circumstances, even in such a case. In most instances, however, the experience of the older and more conservative cities of the world is suggestive. A height of sixty or seventy feet of wall has been found to be equitable and lucrative in return; more than this, immediately creates conditions which are either inimical to the property itself or to that adjacent. Therefore, some such limit would seem advisable.

The existence of small holdings is constantly an obstacle to the proper and economical development of properties, and it has repeatedly been shown that better planning, and consequently better and more economical buildings in every respect, can be applied to large lots than to a number of small lots, the aggregate of which would be one large lot. Especially is this true for business buildings and for apartments. For all public buildings it is an absolute necessity. Therefore, any law which will encourage large instead of small façades is a positive advantage.

This brings up the point of foresight in the planning of new portions of cities, in the laying out of new streets, the sequestration of property for public purposes, etc., all of which have been notably neglected in American cities. Abroad, there is in each city a set of officials whose duty it is to see that public buildings shall be adequate both in efficiency and design; that they shall be well placed, well surrounded, and well maintained. It seems absurd to be obliged to advocate the establishment of boards or commissions of such officials in American cities, but they are sadly needed. With the exception of isolated and infrequent art commissions and village improvement societies, no such departments for the care of city development exist. Buildings are placed in expedient—not in selected—positions, and are in most cases meanly surrounded and with inadequate approaches. City halls, public libraries, schoolhouses, etc., merely occur, certainly in but few cases are carefully considered as to site. No provision is made for the effective grouping of important buildings; each is isolated and unrelated to anything about it, and this negligence is the more inexcusable as there is the example of the cities of every other country excepting the United States constantly manifest—new cities as well as old—for nowhere has more care been taken in placing public buildings than in Vienna and in Budapest. In the former advantage was taken of the space occupied by the old city walls to lay out the magnificent Ring Strasse, upon which every vista has its axial monument or building; and in the latter the banks of the Danube have been nobly treated, and the great boulevards, such as the Andrassy Uitcza, are a long vista of fine façades, each of 150 or 200 feet frontage. No high buildings have been permitted in these cities; no bare party walls without a window, and of different material from the façades, are to be seen; little, if any, incongruous masses of building are to be found. Everything is well considered, carefully proposed, and adequately carried out, and the result is that, after a sojourn in cities of this character, the crudeness and vulgarity of the average American city is intolerable. Yet there are individual buildings in America of great merit, and they are not few in number, but they are lost in the general heterogeneous collection of experiments. With us it is not liberty of action, but the license of ignorance and thoughtlessness, and can only be corrected and overcome by the intelligent control of laws similar to those cities.

In relation to specific laws for municipal improvements, those of Paris are perhaps the most suggestive, and have been already mentioned. The following foreign cities have definite laws:

, London.—The laws are very voluminous and in many cases contradictory, and are severely criticized by architects for that reason. No high buildings are allowed, however. The general tendency of the architecture in the more dense portions of London is toward constantly increasing size of ground plan. There is a city council which controls all prospective and actual laying out of streets, creation of monuments, etc., and which has upon it men of ability and distinction.

Berlin.—Municipal improvements are largely influenced by the Imperial Government's desires. There is a board of control which has experts upon it appointed for their knowledge and merit.

Vienna.—Similar to Berlin.

Budapest.—Similar to Berlin.

Munich and Dresden.—Each under governmental control, with commissions appointed from eminent men.

Italian cities each have their Societa of Arts, which strongly influence the character of the work in each city, and all of which are under government supervision.

French cities frame their art departments upon that of Paris, where all important buildings and monuments must receive the approval of a special department with an accomplished architect as its chief factor.

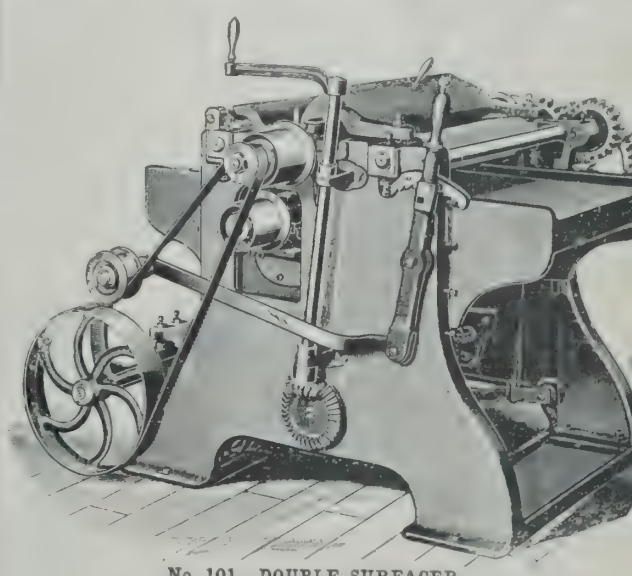
In all cases it has been long recognized that it is most unwise to allow cities to grow at the mere caprice of private individuals without a consulting and advisory intelligent factor at hand. In mediæval times such a factor was supplied by the patrons of the arts, who were the best educated men of their time, or by the chiefs of the monastic orders, who were also men of cultivation. In modern times these elements have been replaced by commissions of authority, composed of artists, architects, and men of culture, in whose hands the welfare of the public could be placed. In but few cases has this confidence been abused—and certainly no more reasonable method could be desired for obtaining the best results and for checking sporadic cases of eccentricity.—C. Howard Walker in The Inland Architect and News Record.

Plans have recently been filed in New York city for a seventeen-story apartment house, says Carpentry and Building, which has some novel features. It is to be built on Fifth Avenue, just across the street from a famous restaurant. The elevator shafts of the new house will be sunk deep in the ground, so that passengers can enter a tunnel extending under Fifth Avenue and communicating with a system of elevators connecting with the restaurant, which will be remodeled so as to reach the tunnel entrance. In this way the residents of the apartment house can, by means of an underground passage, reach the restaurant and return to their rooms without the necessity of going outdoors. The tunnel will be handsomely fitted up, and the building will have a swimming tank of large area and luxurious accessories.

A NEW HEAVY DOUBLE SURFACE PLANER.

In the construction of a new heavy double-surface planer the Frank Machinery Company, of Buffalo, N. Y., have produced a machine which, it is claimed, is without a peer in the market.

Every part of the machine is a model of good workmanship. Two sizes are built, to plane 24 and 30 inches wide and 6 inches thick. The cutter heads are cast upon shafts of the best crucible steel, two sides of the head being faced with steel to form the lips. This combination has been found by long experience to produce a cutter-head unequaled for strength and durability. The upper cutter-head is belted at both ends.



No. 101.—DOUBLE SURFACER.

The bearings are 1¾ inches in diameter, those of the upper end being 8 inches long, and journals babbitted with the best quality of metal. The lower cutter-head rests upon a cradle or slide so arranged that it can be drawn out, giving free access to the knives for adjusting and sharpening, or can be entirely removed from the machine instantly without disturbing other parts. The knives can be adjusted exactly to cut while the head is drawn out.

The feed rolls are 4 inches in diameter, the upper rolls being heavily geared and weighted, giving a very strong and positive feed. The weights are entirely beneath the machine, out of the way. Three changes of feed are furnished.

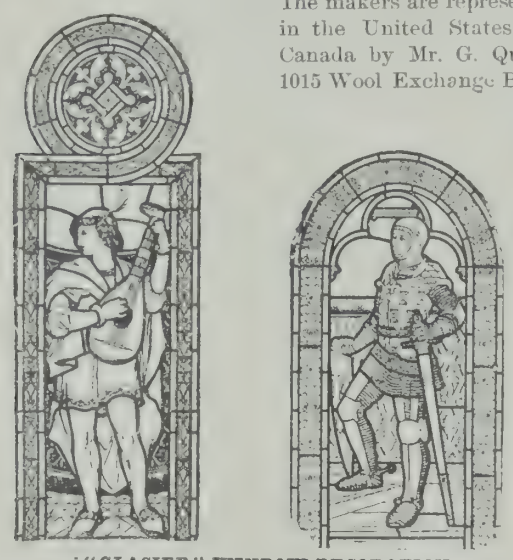
The feeding-out rolls are placed behind the cutter-heads so lumber will be fed entirely free from the planer after being planed, the arrangement of the lower head allowing this to be done without adding materially to length of the frame.

The machine is equipped with a heavy swinging chip breaker, set close to cut of knives to prevent tearing in planing cross-grained lumber.

The machine can be changed almost instantly to do single surfacing, as all that is required is to draw out lower head, no other adjusting being necessary.

"GLACIER" WINDOW DECORATION.

"Glacier" is a substitute for expensive stained glass. It was invented some eighteen years ago by Messrs. McCaw, Stevenson & Orr, of Belfast, Ireland, and every year has added to the excellence of the manufacture. The makers are represented in the United States and Canada by Mr. G. Quaile, 1015 Wool Exchange Building, New York city. Figured, geometrical, and conventional designs numbering over a thousand can be obtained; and by artistic combination original ideas can be carried out.



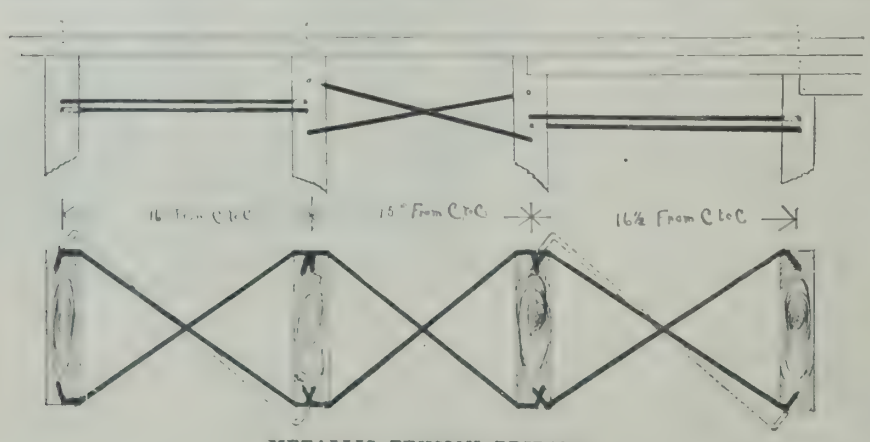
"GLACIER" WINDOW DECORATION.

The descriptive circular of the makers, valuable as the information which it contains may be, does no justice to the possibilities of combining designs nor to the small cost. For this reason Mr. Quaile, if provided with a rough sketch of the window to be treated, together with its dimensions and location, will suggest a design and exactly state its cost. The beauty of "Glacier" window decoration, together with its great cheapness, are the chief points of interest in the product.

The Sprague Damper and Valve Regulators, for the purpose of equalizing the temperature by controlling the dampers of the furnace, have been made the subject of flattering commendation by W. M. Brinkerhoff, managing director of the heating interests of many prominent manufacturers. The testimonial was unsolicited by the makers of the Sprague Regulator, the Howard Thermostat Company, of Oswego, N. Y.

A METALLIC TENSION BRIDGING.

A very stiff, strong floor system can be obtained by the use of the metallic tension bridging shown in the cut. It is made of 3-16 inch wire, with ends pointed and bent oppositely at right angles. One end is driven into the upper edge of one joist, and the other into the lower edge of the next after the floor is laid. It is much cheaper than wood, and requires less time to put in place. It is not so unsightly where joists are exposed as in factories, basements, and many other buildings. Besides, it obviates the collection of dust that becomes objectionable from being jarred down by the vibration of the floor from the running of machinery or other causes.



METALLIC TENSION BRIDGING.

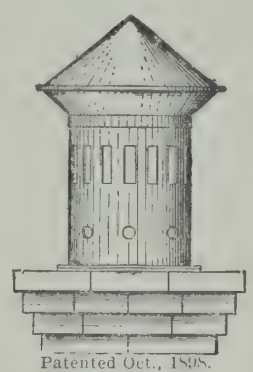
There is no waste as in wood, and any varied spacing of the joists is readily allowed for by setting the points farther over, or when the difference is considerable by allowing the bridge to reach beyond the top, the points being driven in the side of the joist. Different lengths are provided, however, for various spacing of centers.

The A. H. Peirce Manufacturing Company, of Chicago, are the manufacturers.

CHIMNEY TOP AND VENTILATOR.

In winter more than summer, provision for ventilation is apt to be lacking, because people shut their doors and windows as tightly as possible to exclude the cold. The figures that sanitary engineers give for the amount of fresh air that ought to be admitted into living-rooms, to take the place of that which is vitiated by breathing, are almost startling.

One of the best ways to secure good ventilation is to have an open grate fire. Another is to put some device on the chimney which will promote suction, and draw freely from the atmosphere contained in the rooms which open into it. One of the ventilators which is now attracting attention, the "Sunshine," made by the Sunshine Ventilator Company, 1123 Broadway, Manhattan, New York city, is shown herewith. It consists, in the main, of an outer cylinder, perforated with slits on all sides, and an inner tube, tapering slightly as it rises, and reaching not quite to the top of the dome-like covering placed over the two. The gases of combustion and foul air from within the house come up through the tapered tube, flow over its edge, dive down to the slits in the outer cylinder, and so escape. They cannot get out in any other way. A strong, steady draft is insured. Inasmuch as the device is open on all sides, it will work well, no matter from what direction the wind comes. At the same time its form prevents the blowing of any wind down the chimney, and it excludes rain and hail.



Japan Paints.

Owing to their lack of elasticity and to atmospheric action, paint and varnish have hitherto failed as preservatives. Varnish made with gums begins to deteriorate from the moment of its application. For these reasons paint hardly justifies the expense and labor of applying it.

After a series of experiments extending over a long period, Messrs. John Mair & Sons, of 136 South Delaware Avenue, Philadelphia, Pa., have succeeded in producing a paint varnish free from the defects referred to, capable of being incorporated with the most delicate shades without affecting the color, possessing the requisite elasticity by which the contraction and expansion of metals is accommodated. Its surface is smooth, thus preventing the lodgment of corroding acids and bacteria. It is not an enamel, but a genuine varnish paint without gum, combining the clarity of old Japanese lacquer with the ease of application of modern varnish.

FIRE-PROOFED WOOD.

The investigation of the Underwriters' Bureau of Fire Protection Engineering, of Chicago, recently submitted a report on their experiments with fireproofed wood, treated by the American Wood Fireproofing Company, Bowling Green Building, New York city.

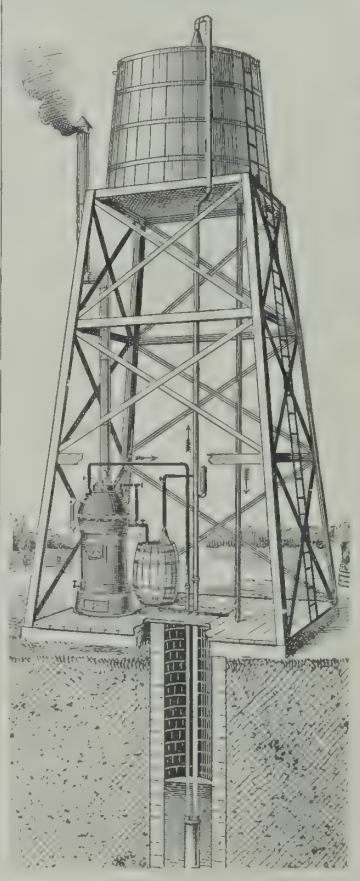
The treatment used in the process is akin to embalming, the wood being deprived of its sap and receiving instead a preserving fluid. When held in an alcohol flame, slivers of wood charred and glowed, but upon the removal of the flame the glow immediately vanished. Combustion was not supported without the alcohol flame. Like results were obtained with slivers cut from samples which had been soaked in water at ordinary temperature for one hundred hours. A blast torch applied to the surface of a treated sample produced no effect beyond charring at the point where the flame was applied. The charred surface protected the interior portions; and it was with difficulty that the sample was burned to any considerable depth. The same test was applied to samples which had been repeatedly washed and scrubbed, with little, if any, difference in the result. Varnished samples were repeatedly subjected to the effects of a blast torch to note the action of the inflammable finished surface. In no case would the varnish support a flame when the torch was removed.

The investigating committee commented favorably upon the results obtained.

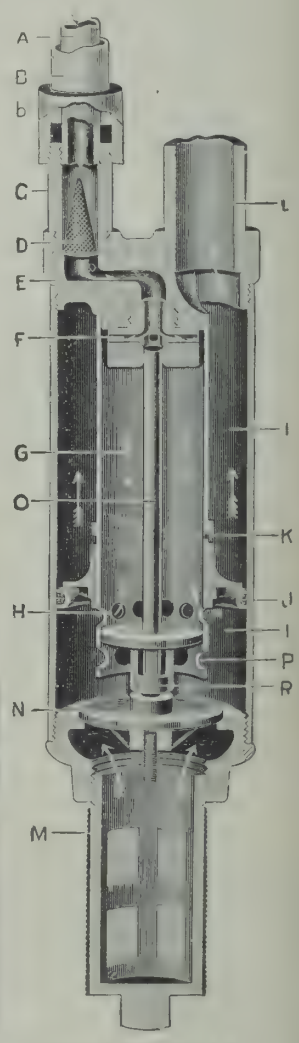
AN ECONOMICAL AND EFFICIENT WATER SUPPLY SYSTEM.

To meet the requirements of modern residence, water supply has been the study of engineers and architects for years. The development along this line has presented problems not easy of solution. To keep pace with the growing demand for proper sanitary conditions many appliances have been tested with varying degrees of success. The windmill has succeeded mainly in the advancement of the demand for better service—failing, owing to variable wind power, for days at a time, and this more frequently when water can be obtained only with the greatest difficulty. During such periods, the supply for the household must be secured by great sacrifice of time and effort, and that for the live stock must remain inadequate, awaiting favorable natural conditions. Quite recently a unique adaptation of steam has rendered an unfailing and trustworthy supply quite certain, and this with but small cost. Such a system requires only that a vein of water be tapped, or that access be had to a stream, lake, or cistern supply.

This has been accomplished by the introduction of the steam ram, a device having the merits of compactness and small diameter and great pumping power. It can be placed readily below the surface of the water in the well or cistern, or be so set as to pump directly from a lake or stream. Its advantages in operation are that it requires no oil, no packing, and no attention. The friction is slight, and water is raised with economy in the use of steam. A great portion of the work is accomplished by the pressure of the atmosphere, the action of the steam being used to create a vacuum into which the water is forced in such quantities as not only to fill it, but to overflow and to pass on through the ram and into the discharge pipes. The steam and air co-act to make the discharge of water continuous. The cuts shown give a sectional view of the device as manufactured by James B. Clow & Sons, of Chicago, Ill., and a system in complete working order. An endless variety of locations for the appliances makes its use possible under almost every imaginable condition.



AN ERWIN PUMPING SYSTEM.



THE ERWIN STEAM RAM (Sectional View).

By connecting the discharge pipes of two single rams, a double ram of twice the capacity of a single one is formed, each having a separate pipe, but the two using the discharge pipe in common. While they work in unison in forcing water, either one can be shut down by turning off its steam-valve, without stopping the other. In addition to doubling the capacity, therefore, the double ram renders a constant supply quite certain, in which respect it differs from the ordinary duplex pump, in which one cylinder at a time only forces water, and in which, if any part should give out, both cylinders would be rendered inoperative.

The practical applications for such a device are almost unlimited wherever the elevation of water is desired. We note that it is used not only for railroad work, but also for irrigation and mining purposes, for steamboats, hotels, private residences, villages, etc. Its steadiness and power give it an advantage over the windmill, while its simplicity and low cost are among the features which render it frequently more practicable than the steam pump or gas engine.

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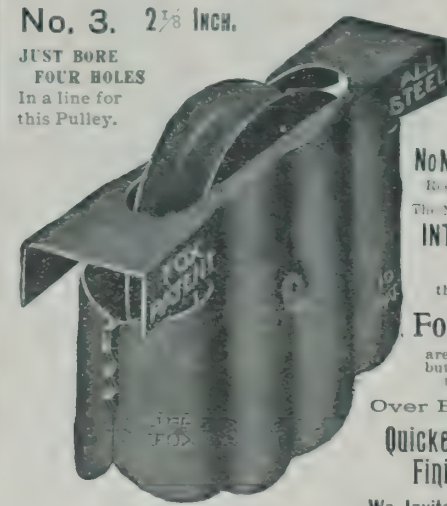

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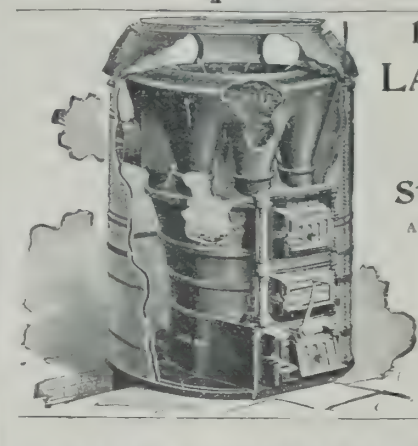

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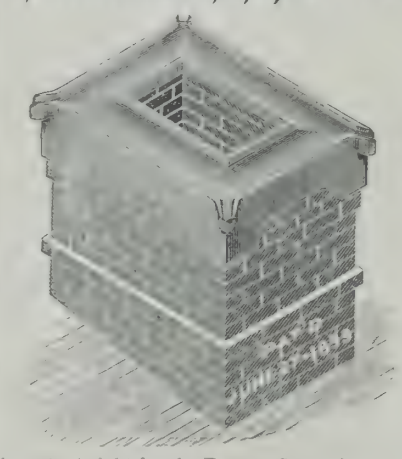

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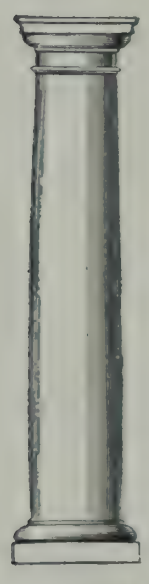

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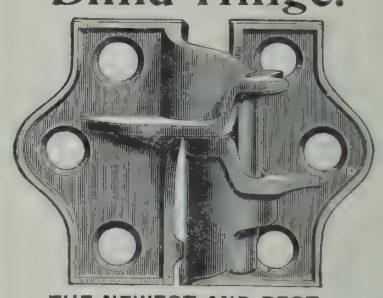

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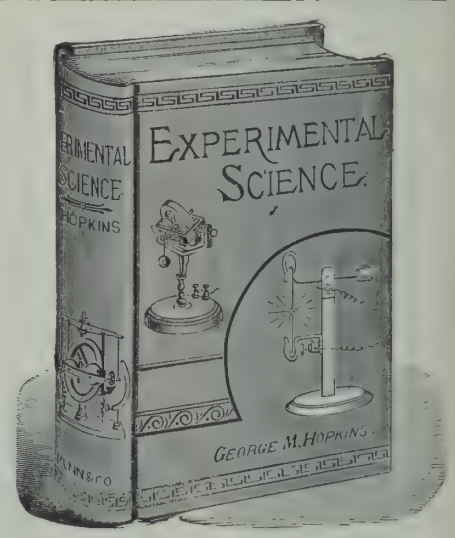

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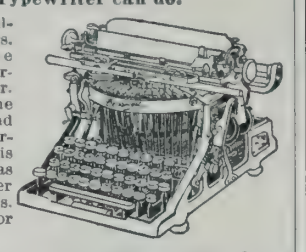

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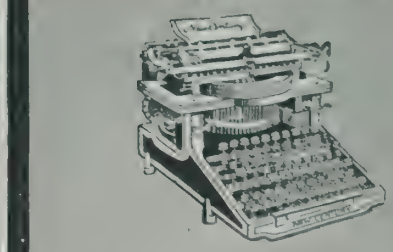

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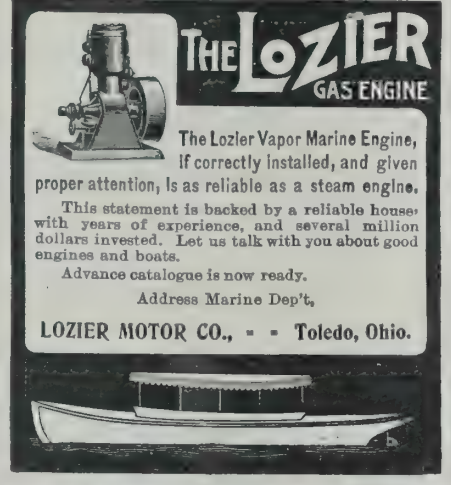

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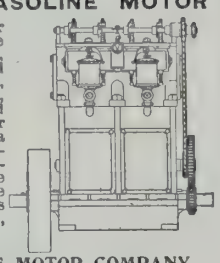

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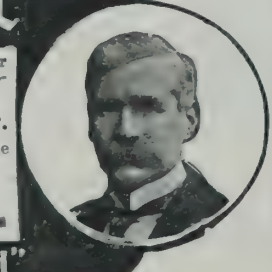

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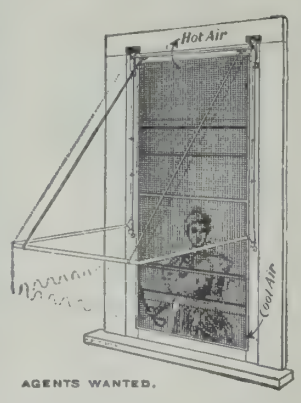

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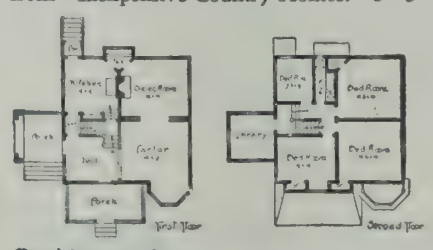

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VIEW OF HALL—A RESIDENCE AT ROWAYTON, CONN.—See page 82.

MR. HENRY C. PELTON, ARCHITECT.

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A PLEA FOR STAINED GLASS.

IT is not often that really interesting and practical papers are written upon such subjects as stained glass, mosaics, etc., but in "The City Beautiful," published by the Committee on City Affairs of the Reform Club, New York there is a most interesting article entitled "A Plea for Stained Glass," by Henry L. Parkhurst, Esq., who aptly says that to thoroughly appreciate its æsthetic value one must be born to a realizing sense as to its distinguishing characteristics, and then of its power of expression and the value of its different art elements. Too often stained glass is good in itself, but is in the wrong place. Stained glass controls absolutely light and color tone, and gives a living, penetrating color which by its proper adjustment and handling fulfills the highest purpose of color. Its proper adjustment depends largely upon other features, for colored glass can be presented to the observation favorably or unfavorably by a good or bad composition in drawing. This combination of the strongest factors, color composition and drawing, is the chief characteristic of the stained glass art; but the ratio is inverse to that of painting. It admits of an exceedingly strong development, and the peculiar force of its color gives an irresistible power of expression, and justifies the demand for greater public patronage than it at present enjoys. The most successful windows are those which have been placed in penetrations specially designed to receive their particular kind. This, of course, renders it of particular value for use in public buildings, and the question of a larger use of stained glass than is being made at present in them seems to be principally one of providing a place for it. Stained glass is an excellent adjunct to the house, either city or country, and this fact is now being appreciated by architects and builders and their clients, and stained glass is much more extensively used to-day than it was fifteen years ago.

Much better work is being done in making the glass and in putting windows together. The art is just beginning to occupy a prominent place in house decoration, and the value of simple patterns executed in clear window glass is being fully appreciated by architects, and comparatively few houses are now built without having at least a small quantity of leaded glass. When the work is well designed it gives an artistic atmosphere to the houses, greater in proportion to the labor involved than that given by wall decorations. Even the simple diamond-shaped panes add greatly to the attractiveness of a room. Many patterns possess the value of belonging to certain styles of architecture, which lend an interest in addition to their artistic value. Large panes of glass were rarely if ever obtainable in the old days when stained glass was extensively used, as in Gothic and Renaissance times. When the manufacturer perfected his machinery so as to make sheets large enough to fill a whole window opening, the large panes were considered preferable to leaded windows or small panes in wood bars, because people could see out of the window better and because they lessened the labors of housecleaning. These two reasons still seem sufficient to counteract in many cases any idea of the artistic value of leaded glass windows. No doubt it is pleasant to be able to see clearly from a window in a house, but it is hardly a matter of great necessity that one's vision be absolutely unobstructed, and, of course, in public buildings it can hardly be a matter of necessity or even desirable, and a more extensive use of the leaded glass in our public buildings would enhance their general architecture and decorative effect.

Colored glass might also be used much more in shop windows and signs than it is at present. If the amount in each store-front was small, and if it contributed a little, the long line of store fronts would present a beautiful line of color, provided there was some controlling sense of color. The value of color, not only in stained glass, but in decoration as a factor in our daily surroundings, cannot be too highly estimated, and in reference to stained glass there is one thing to be borne in mind, and that is, unless it is very good it is about the worst thing that there is in art. If you wish to commit a crime, make a bad stained glass window. It will be worse than bad sculpture, for it will shout out its criminality at every one unceasingly.

THE FARMHOUSE PROBLEM.

IT is not often that the farmhouse comes in for much attention from the architect, or by architectural writers, except where a fine farm has been acquired by some wealthy person who wishes to gratify a whim for a handsome farmhouse and dependencies. A most interesting article upon the subject by Robert C. Spencer, Jr., appears in the book of the exhibition of the Chicago Architectural Club, a most handsome pamphlet some what on the order of the catalogue of the New York Architectural League, except that it has literary contributions as well as illustrations. Mr. Spencer considers that for an architect there is no better way for spending a summer's holiday than awheel in a prosperous farming country, seeking interesting examples of domestic architecture in the rough. He justly remarks that one must expect little, and be content to find his pleasure chiefly in the enjoyment of the woods and fields, for the average farmstead adds but a doubtful charm to the landscape. A near view will show a habitation so brutally bald, ugly, forbidding and neglected in the midst of such dismally bare and repellent surroundings that it may be said of our own benighted heathen, still deaf to the gospel of beauty, that they live in a land "where every prospect pleases and only man is vile."

Amid the freshness and beauty of the fair open country, one cheerless or unsightly house seems by contrast more discreditable to a highly civilized and progressive race than a whole row of them in the city, but when a picturesque and homelike farmstead greets the eye at some turn in the road, the grateful picture sinks into the beholder's memory not soon to be effaced. Unspoiled by the crude latter day vagaries of the village carpenter or the blighting influence of the ready-made plan of commerce, houses, barns, windmills and outbuildings are sometimes found happily placed as to site, and built in seemingly haphazard yet sturdy and purposeful fashion, with wings and perhaps other supplementary structures of later build for growing needs. Enhancing the charm of such a home one is likely to find a broad sweep of green between the house and the road, well kept hedgerows separating lawn from orchard, orchard from field, and garden from both, and tall trees towering above roofs and chimneys, while flowering vines reach to the eaves and droop again in waving streamers. Upon studying such a type as this, as is often found in New England, where the sober conditions of colonial work still have a strong hold upon the country builder, it will be seen by the architect familiar with all the cunning tricks of nice planning and in sympathy with farm life, that an excellent beginning has already been made for one of his ideal good farmhouses. In northern New England, and here and there in the West where New Englanders have settled, the typical farmhouse is a long, rambling structure, with the parlor and guest room at one end and the barn and workshop at the other. In northern regions where old-fashioned winters with deep drifting snow still reign, the convenience and comfort of this type are obvious, and Mr. Spencer gives an interesting plan of such a farmhouse, which is designed to eliminate the most serious defects even in the best of these buildings. These defects, some of which are due to perverted ways of living, are first a connection between kitchen and barn, inadequately shut off against odors; second, incomplete or inconvenient laundry, fuel, pantry, and other working arrangements; third, lack of bathroom and other sanitary convenience; fourth, and perhaps most serious of all, lack of a large, sunny, attractive living-room in place of the old-fashioned parlor held sacred to memorable occasions, such as weddings and funerals. One needed feature seldom provided, is a roomy entry set aside for the male members of the household in which they may remove dirty boots and overalls, and clean themselves up properly before entering the kitchen or living-rooms. In planning and placing a house in a sharply rolling country such advantage of the site may usually be taken to provide an easy and convenient access to house and barn on two levels, giving an added charm and picturesqueness to its various aspects seldom found in the level prairie. Mr. Spencer also gives an illustration of a field stone farmhouse having no existing prototype, suggested by a desire to show the neglected but delightful possibilities of local materials in the hands of rude workmen. The arrangement is simple, yet good, and special provision for the enjoyment of al fresco repasts in the summer is provided by the vine-roofed terrace, which juts out into a sharp slope overlooking a fair and fertile valley. Such homes as these are not beyond the means of many a farmer, and they would conduce very largely to the comfort of the family, which are often obliged to lead a rather dreary life. It is to be hoped that a quickened desire for better housing and more beautiful surroundings will in good time bring the farmhouse builder into sympathetic touch with the architect, who can and will give the smallest problem his largest thought to benefit his fellow men, if not for gain.

A SUMMER COTTAGE FOR DEAL COUNTRY CLUB, DEAL BEACH, NEW JERSEY.

WE present on page 86, in this issue, a summer cottage erected for the Deal Country Club, at Deal Beach, New Jersey. The engravings present a design both novel and attractive, intended for the summer season, and arranged for lounging and sleeping. The scullery apartments and dining-room are centered in one great club, within easy access. This cottage is one of many others of the Deal Country Club cottages which we have illustrated in our previous issues. Treated in the gambrel roof style, it is built upon posts with stone footings, without cellar. The exterior framework is covered with sheathing and then shingled, and painted a warm brown color, with white trimmings. The roof is also shingled and is stained in harmony. The trim throughout the interior is simple whitewood, mitered and then painted white. The walls are tinted in delicate colors. The house contains a reception hall, one bedroom, and bathroom on first floor, and four bedrooms and closets on second floor. The reception hall contains an open fireplace built of Roman brick, with hearth and facings of like material, and a neat mantel. The staircase is built in a circular projection, and is provided with newel, balusters, and rail of dainty design. The bathroom is wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The bedrooms are provided with good closets. Mr. William G. Massarene, architect, Deal Beach, New Jersey.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN DWELLING AT PLAINFIELD, N. J.

ON page 87, in this issue, we present a modern dwelling which has been erected for Mr. Francis Clark, at Plainfield, N. J. The exterior is treated in the gambrel roof order, and has many excellent and attractive features. The underpinning is constructed of stone, covered on the outside with a composition of very rough stucco work. The exterior framework above is covered with sheathing, paper, and shingles, and is stained a dark brown, while the trimmings are painted cream white. The roof is shingled and stained in harmony. Dimensions: Front, 31 ft. 6 in.; side, 42 ft. 6 in., not including piazza. Heights of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior arrangement is most excellent. The trim throughout is of white pine treated with white enamel. The floors are of highly polished oak, and the cornices are of wood. The main hall is very unique. At one end of the hall is a den, which is provided with a cluster of leaded glass windows, and is separated from hall proper by archway and Colonial columns, while at the opposite end is a box stairway leading up to second floor, which is built in an effective way with an elliptic arch, etc. This stairway is only a box one to main landing, the remainder of the way being open, with newel posts, balusters, and rail. This hall contains also an open fireplace built of Tiffany brick, with facings and hearth of same, and a mantel with mirror, etc. The parlor, treated in a dainty manner, has a bay window thrown out at front with seat. The dining-room walls are covered with burlap, and the trim painted with white enamel. The kitchen and its apartments are most complete in their appointments. The bicycle-room is conveniently located, with outside entrance thereto. The second floor contains four large bedrooms, ample closets, and bathroom; the latter wainscoted and treated in white enamel, and provided with porcelain fixtures and exposed nickelplated plumbing. The third floor contains servants' room, besides ample storage. A cemented cellar contains furnace and other necessary apartments. Mr. A. L. C. Marsh, architect, 97 Nassau Street, New York.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT ROWAYTON, CONN.

WE present as our subject for colors, and also on pages 81, 83, 84, 85, one of the finest country residences on Long Island Sound, which has been recently completed for John Sherman Hoyt, Esq., at Rowayton, Conn. The building, treated in the Elizabethan style, stone and half-timbered, is a most excellent example of a rambling country house, and it combines satisfactorily

well executed and attractive elevations and well arranged plans. The interior is finished off in a stately and dignified manner, and it is provided with all the necessary appurtenances to make a country house complete in every respect. The underpinning and first story are built of rustic field stone laid up at random, while the superstructure, of wood, is beamed with oak and stained a dark umber; all the panels are of cement and painted cream color, with rough surface. The remainder of the woodwork is of similar wood and treatment. The roof is covered with red slate, and is in harmony with the color scheme of the whole building. The gutters, ridges, leaders, and flushings are of copper. The areaways are lined with enameled brick. The porte-cochère porch is tiled. Decks are covered with canvas. The vestibule has a six-foot paneled wainscoting, ceiling beams, all of quartered oak and stained dark umber, while the floor is of marble mosaic. The entrance hall is treated in the Colonial style, and it has a six-foot paneled wainscoting work is treated similarly. The floors are of narrow quartered oak. The den is trimmed with natural birch. The billiard-room is trimmed with birch, and it has a paneled wainscoting three and one-half feet in height, above which the walls are covered with raw burlap, and finished with a molded plaster cornice at ceiling. The dining-room is treated in the English Baronial style, with massive beamed ceilings and molded cornices. It also has a paneled wainscoting six feet in height. The fireplace and sideboards are handsomely designed, and rise up to ceiling. All the woodwork is of quartered oak, stained a dark umber to give an antique effect. The servants' portion of first story is finished in natural ash. The kitchen and its apartments are fitted up in a most complete manner, with all the best modern conveniences. The chill-room is lined with tile throughout. The floors in these apartments are of quartered Georgia pine. The second floor is finished off in white enamel, except the owner's room, which is trimmed with curly birch finished

A RESIDENCE AT NEW HAVEN, CONN.

THE engravings shown on page 88 illustrate a modern residence which has been erected for E. E. Durant, Esq., at New Haven, Conn. The elevations are well treated, and contain many excellent features, combined with a very good interior arrangement. The underpinning is constructed of red sandstone with rock faces. The exterior above is covered on the first story with clapboards, and is painted ivory white. The second and third stories are covered with shingles and stained a russet color, with ivory-white trimmings, while the roof is also shingled and stained moss green. Dimensions: Front, 37 ft.; side, 46 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The first floor is trimmed with quartered oak. The main hall, entered through a paneled vestibule, contains a nook at side of vestibule and an ornamental staircase with newels, posts, and rail, and a paneled seat at the side.

DINING-ROOM—A RESIDENCE AT ROWAYTON, CONN.—See page 82.

and molded ceiling beams. The fireplace is handsomely fitted up with facings and hearth, and a mantel of Colonial style, made from special design. The stair hall is treated similarly, and it contains a broad staircase, with stairs finished in enamel white, with dark mahogany balusters, rail and newels. The wainscoting continues up to second story. There are window seats on first landing of stairs. All the woodwork in these two halls is treated in white enamel, except the doors, which are of dark mahogany. The two halls are separated by fluted Ionic columns. The reception-room is treated in the French style, with white enamel trim, and it contains an open fireplace, with tiles and mantel. The walls are covered with pink paper of French design. The library, at the extreme end of building, and dropped down two steps from the level of main floor, is treated in the Italian Renaissance style of architecture. It has a six-foot paneled wainscoting, a beamed ceiling, bookcases built in and glazed with patterned leaded glass, and a mantel recess, with seats and mantel of cherry, stained and finished in dark mahogany. The remainder of the woodwork is treated similarly. The floors are of narrow quartered oak. The den is trimmed with natural birch. The billiard-room is trimmed with birch, and it has a paneled wainscoting three and one-half feet in height, above which the walls are covered with raw burlap, and finished with a molded plaster cornice at ceiling. The dining-room is treated in the English Baronial style, with massive beamed ceilings and molded cornices. It also has a paneled wainscoting six feet in height. The fireplace and sideboards are handsomely designed, and rise up to ceiling. All the woodwork is of quartered oak, stained a dark umber to give an antique effect. The servants' portion of first story is finished in natural ash. The kitchen and its apartments are fitted up in a most complete manner, with all the best modern conveniences. The chill-room is lined with tile throughout. The floors in these apartments are of quartered Georgia pine. All bathrooms are finished with tiled floors and wainscoting, and are furnished with solid porcelain fixtures and nickelplated plumbing. The bath tubs and needle baths have separate salt water supply. Drainage is all screw-jointed wrought iron steam pipe. Heating is by indirect steam radiation. The servants' portion of second story is finished in ash. The house is wired in iron pipes for electric lighting and piped for gas; the gas is supplied by automatic machine in basement, and a gasoline tank buried in yard. All electric bell, burglar alarm, and telephone wires run in iron pipes. The third floor contains two large tanks for water supply, two servants' rooms, and a large unfinished attic, capable of furnishing three additional chambers and an additional bathroom. Basement, cemented, contains coal and other storage, laundry and workshop. Mr. Henry C. Pelton, architect, St. James Building, 1133 Broadway, New York.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

The parlor has a circular bay-window, thrown out at the corner, and a false fireplace with trimmings of tile and mantel. The dining-room is conveniently located. The butler's pantry is trimmed with North Carolina pine, and fitted up with drawers, cupboards, and dressers. The kitchen is trimmed and wainscoted four feet in height with North Carolina pine, and is completely fitted up. The second floor, trimmed with quartered oak, contains three bedrooms with large closets and bathroom—the last wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The front bedroom is provided with a toilet room. The third floor contains three bedrooms, trimmed with North Carolina pine, and ample room for storage. A cemented cellar contains coal-cellar, enclosed with brick wall, laundry, with pine floor and set tubs, and other necessary apartments. Mr. William H. Allen, architect, Church Street, New Haven, Conn.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

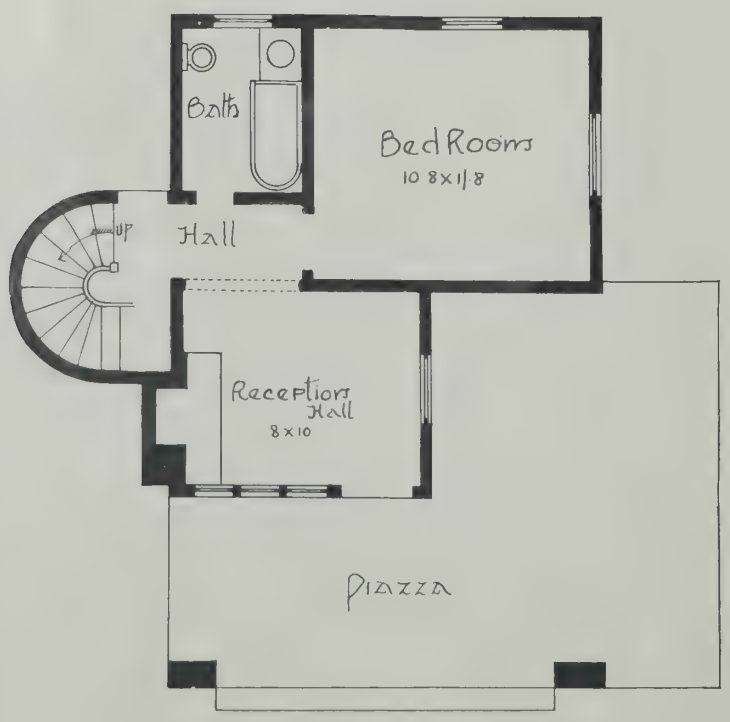
A RESIDENCE AT ROWAYTON, CONN.—See page 82.

MR. HENRY C. PELTON, ARCHITECT.

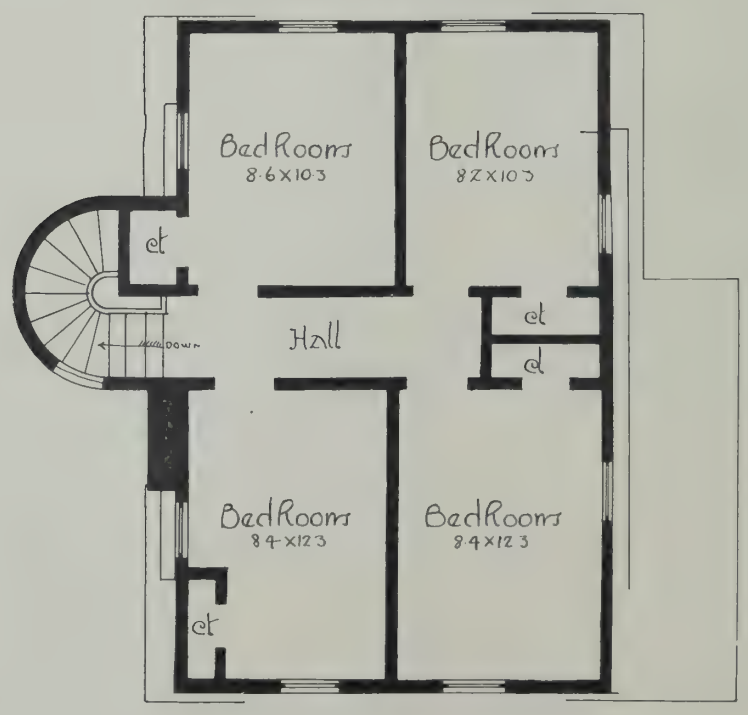
BOSTON PUBLIC LIBRARY

A RESIDENCE AT ROWAYTON, CONN.—See page 82.

MR. HENRY C. PELTON, ARCHITECT.



First Floor



Second Floor

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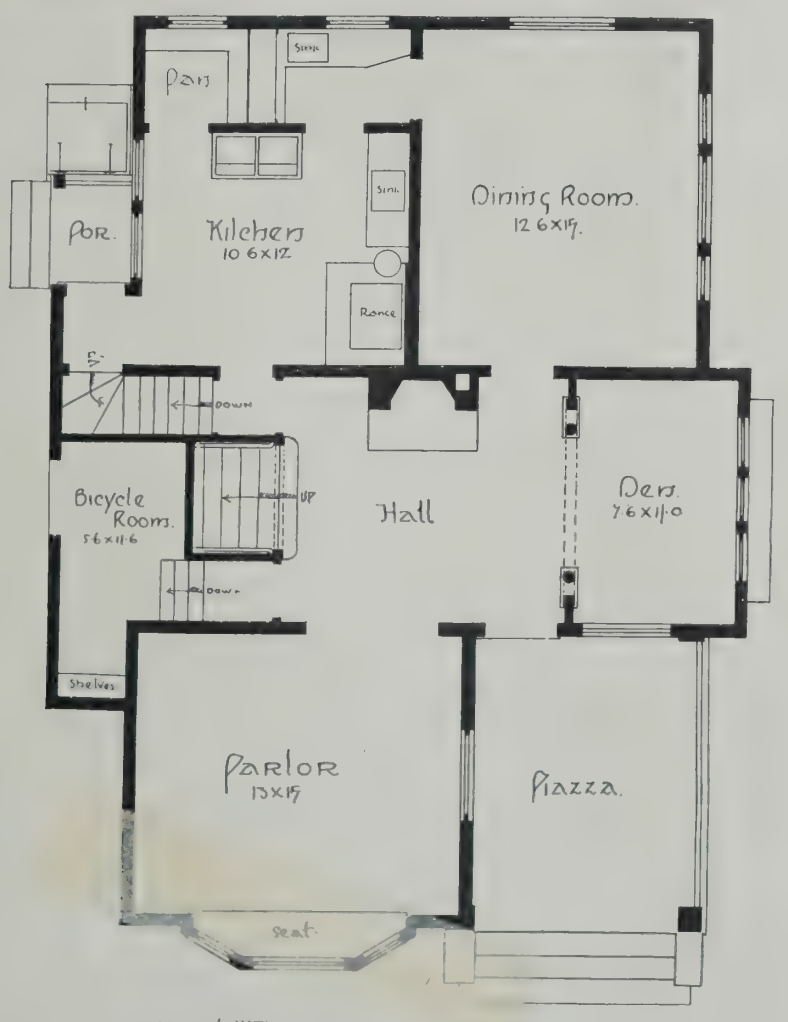
A SUMMER COTTAGE FOR DEAL COUNTRY CLUB, DEAL BEACH, N. J.—See page 82.

MR. WILLIAM G. MASSARENE, ARCHITECT.



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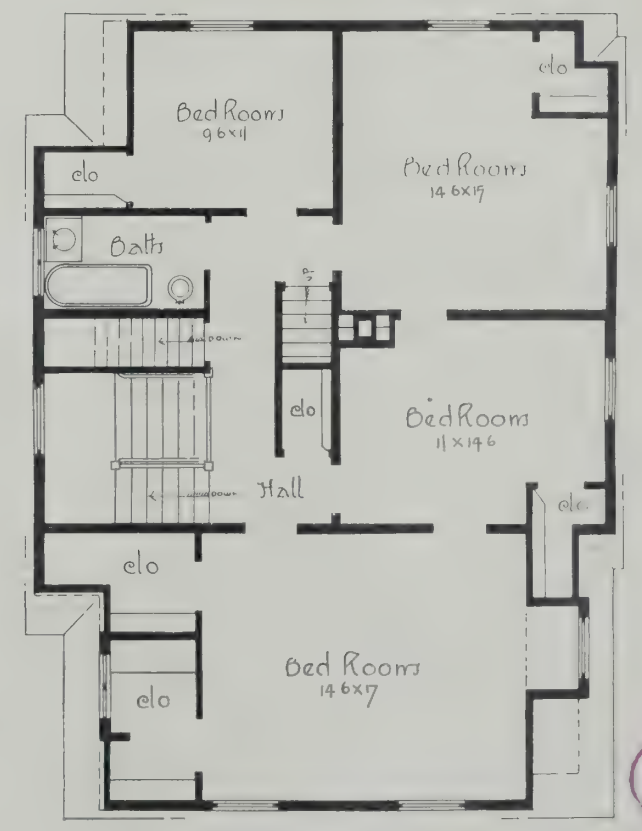

Second Floor

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A MODERN DWELLING AT PLAINFIELD, N. J.—See page 82.

MR. A. L. C. MARSH, ARCHITECT.

A RESIDENCE AT NEW HAVEN, CONN.—See page 83.

MR. WILLIAM H. ALLEN, ARCHITECT.

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"THE BREAKERS," AT NEWPORT, R. I.—See page 96.

MR. RICHARD M. HUNT, ARCHITECT.

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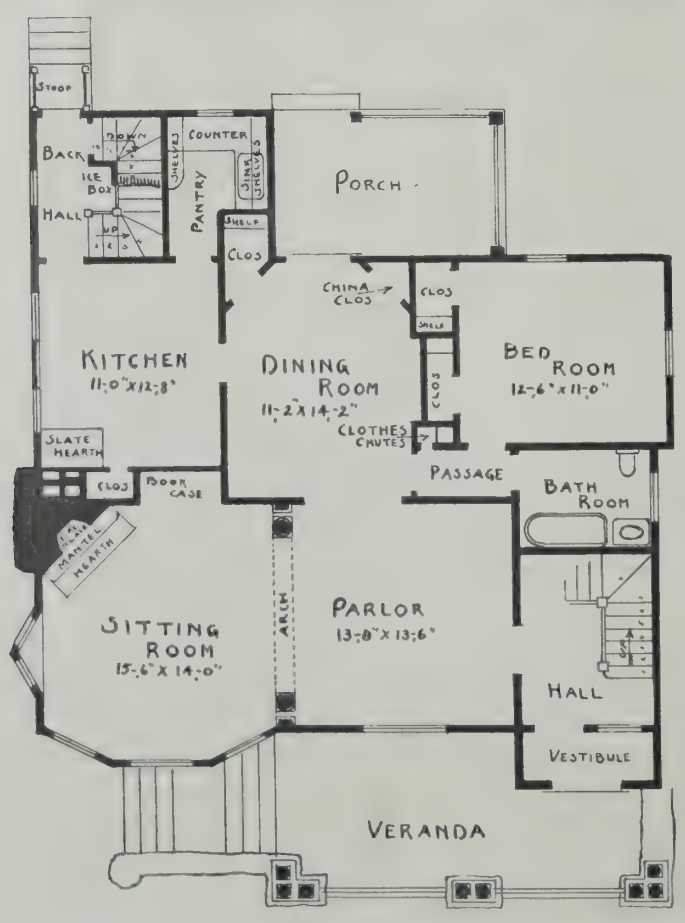

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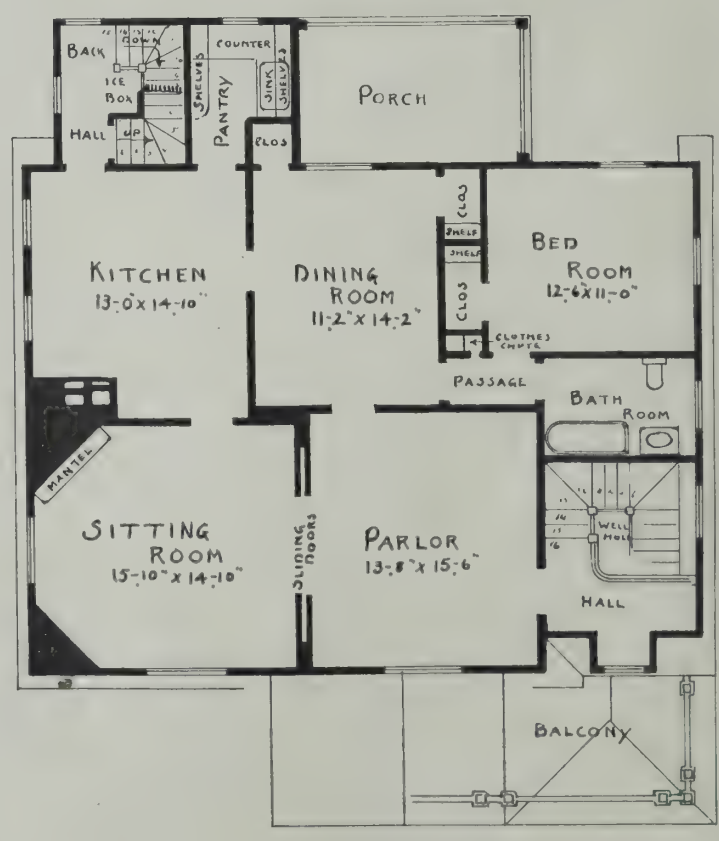

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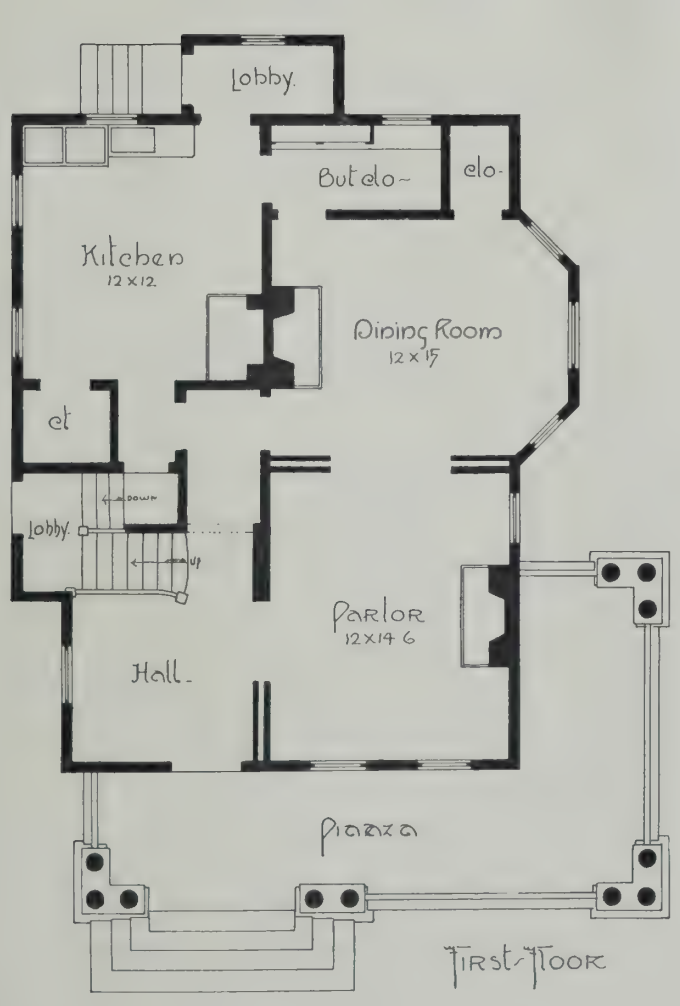
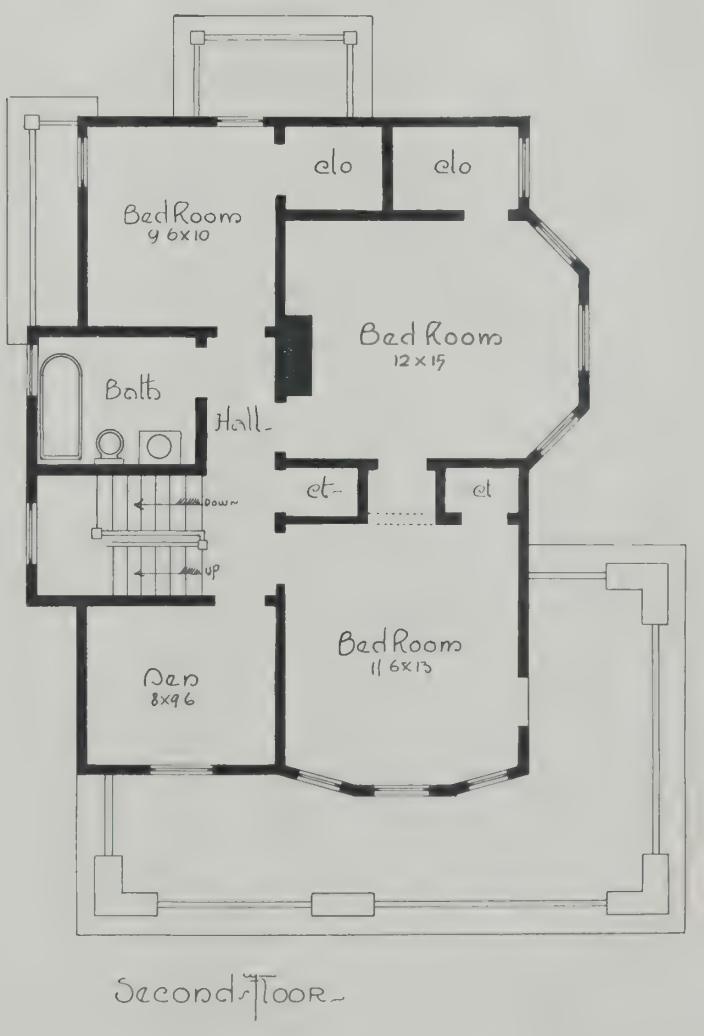
A DWELLING AT NEW HAVEN, CONN.—See page 95.

MR. F. VON BEREN, ARCHITECT.





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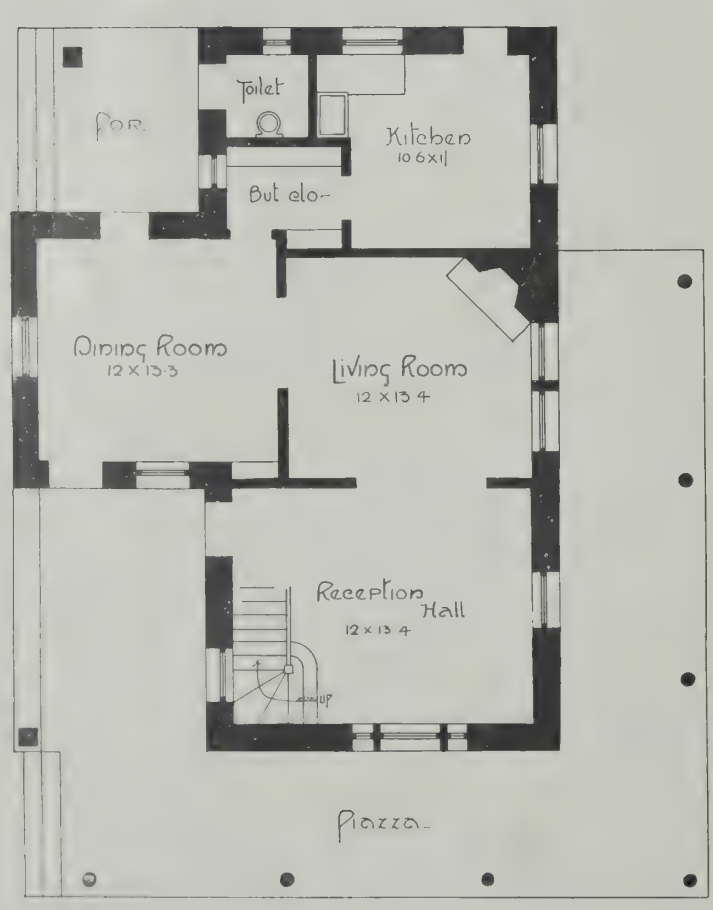
A MODEL COTTAGE AT BAY RIDGE PARK, LONG ISLAND.—See page 96.

MR. HENRY E. HAUGAARD, ARCHITECT.



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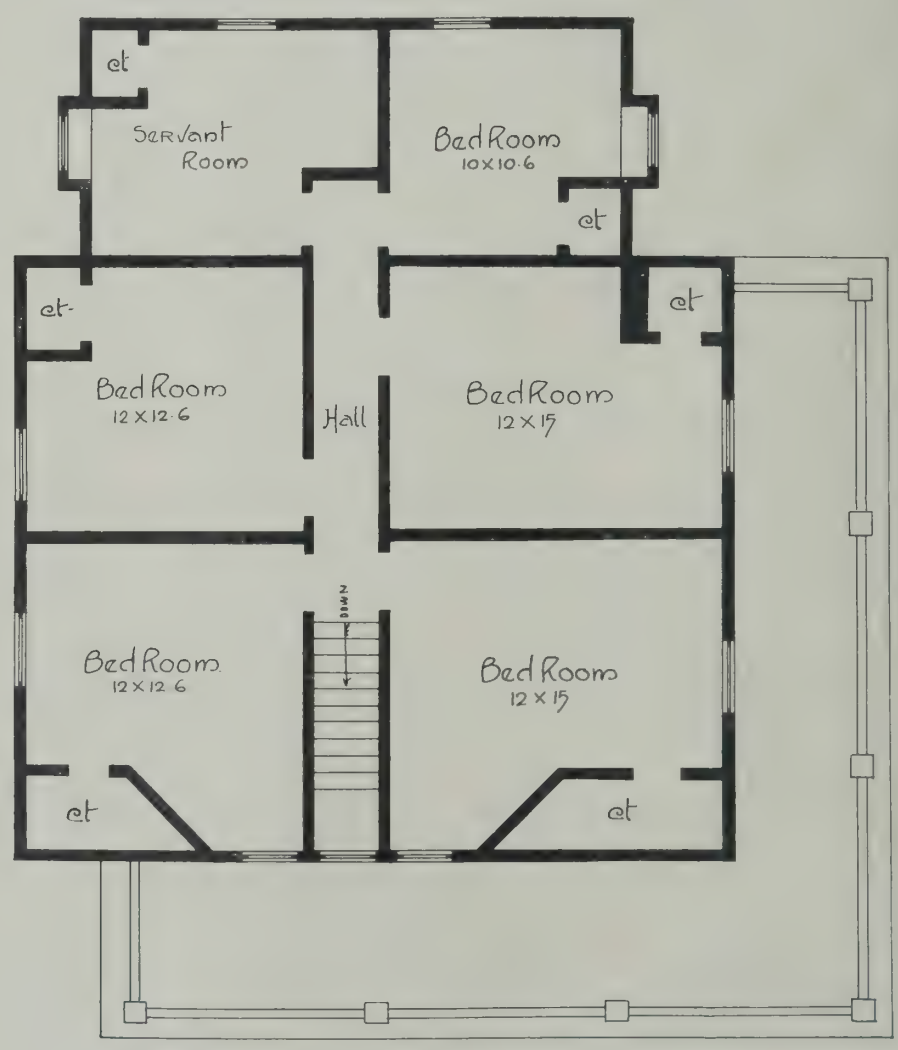
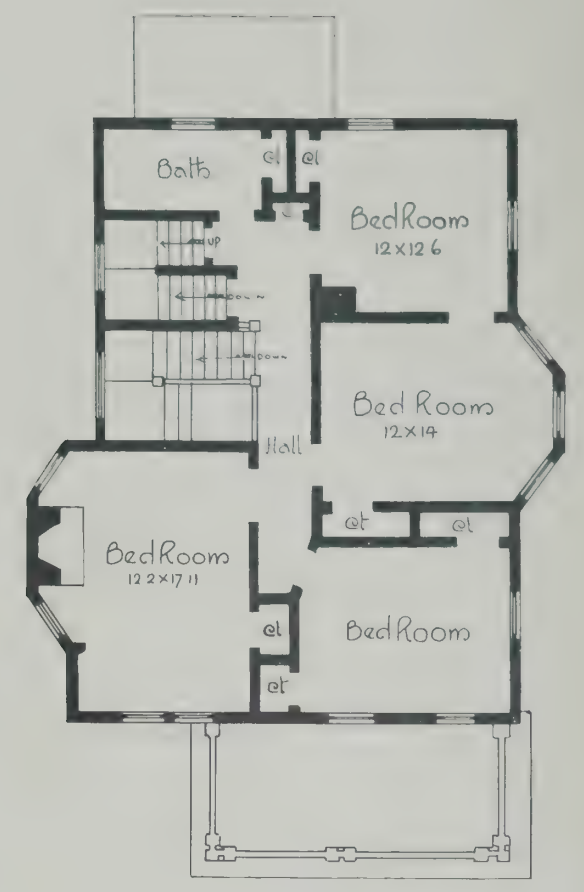


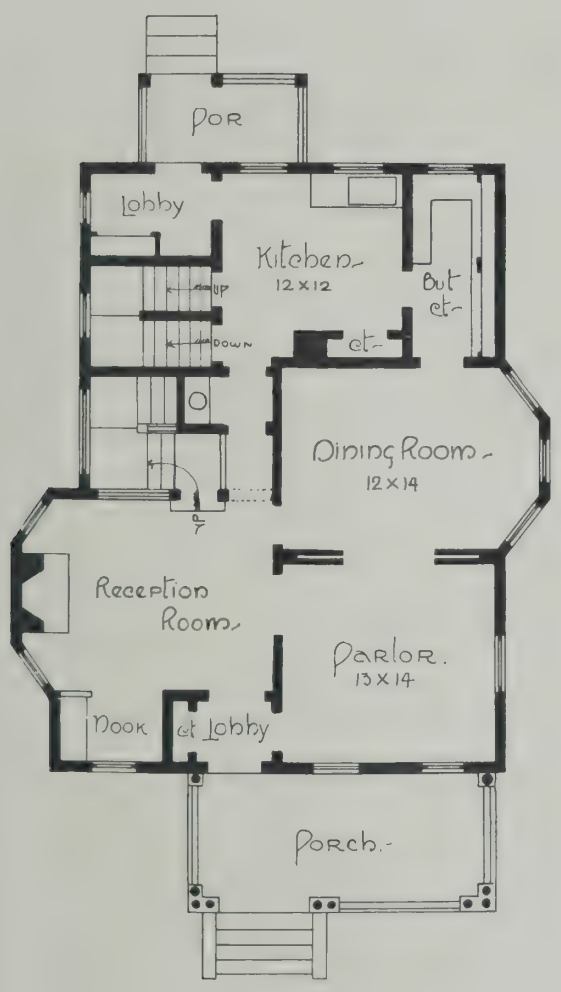
Second Floor

A STONE VENEER COTTAGE AT SOUTH HAVEN, MICH.—See page 96.

MR. A. M. WORTHINGTON, ARCHITECT.



Second Floor.



First Floor.

PUBLIC LIBRARY

A COLONIAL RESIDENCE AT FOREST PARK HEIGHTS, SPRINGFIELD, MASS.—See page 96.

MESSRS. LOUIS FRANK NEWMAN AND CARROLL H. PRATT, ARCHITECTS.

A COLONIAL RESIDENCE AT YONKERS, N. Y.—See page 95.

MESSRS. BRITE & BACON, ARCHITECTS.

NEW BUILDINGS AT STANFORD UNIVERSITY.

AT the opening of the Leland Stanford Jr. University, Palo Alto, California, some eight years ago, only a part of the projected buildings was erected, sufficient to accommodate the twelve or more hundred students and to serve the current necessities of the University.

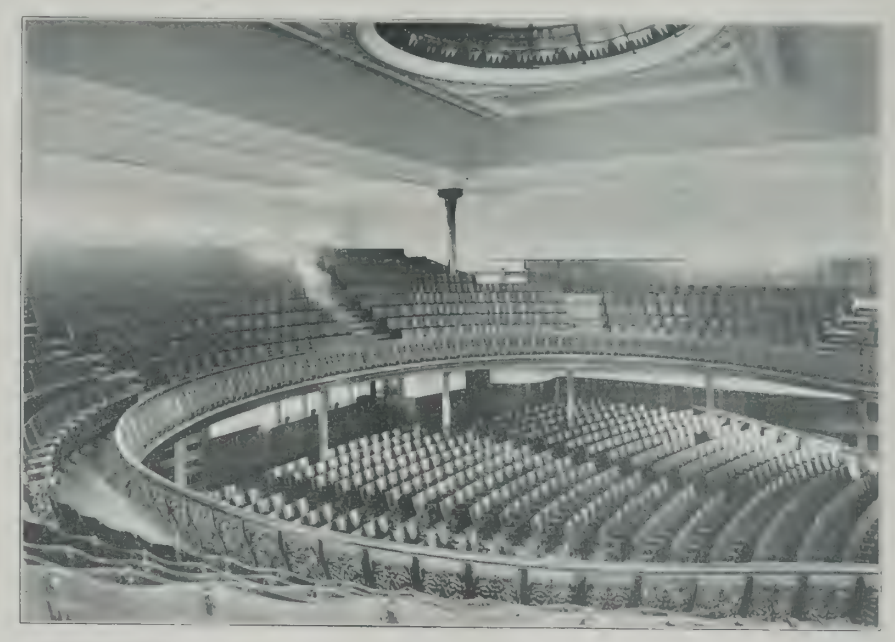
Within a year past the settlement of the estate of the late Senator Stanford has rendered available a very large amount of money, which will create an endowment of at least $30,000,000, besides providing ample funds for new structures.

When the new buildings now under construction are completed, including the magnificent chapel, no educational institution in the world will be provided with accommodations for its students so splendid, architecturally so harmonious, roomy, compact, and beautiful as Stanford. The total cost will approximate $5,000,000. The new library and assembly hall occupy one building 264 x 125 feet in dimensions, and also a considerable section of the great quadrangle, which is 900 feet square. The structure is in the Romanesque style of architecture, in keeping with the other buildings inclosing the square, and, like the rest, is constructed of red San José sandstone. An arcade incloses two sides of the library. The stack room is 67 x 66 feet, and gives room for 120,000 volumes, three stacks high. The floor is concrete, and over the reading-room is an immense dome covered with art glass. The woodwork is of Oregon pine, highly ornamented with beautiful carvings. Electricity furnishes the light. The assembly hall, amphitheatrical in form, will seat 1,200 persons on the floor, and one-third as many more in the gallery. The woodwork is of Oregon pine, with marble staircases, and the ornamentation is highly artistic and refined. The windows are to be of stained glass of the finest character.

The great museum is now complete. It is constructed entirely of concrete, and is monolithic in character. Roof, floors, walls, and staircases are of concrete, only the stairs are of marble. The architects of the three buildings are Percy & Hamilton, San Francisco.

The great Stanford Memorial Arch is now complete, with the exception of the sculptured frieze, which is to represent "The Progress of Civilization in America," the design of St. Gaudens. The dimensions of the arch are: 100 feet high, 84 feet broad, and 36 feet in depth, the opening being 65 feet high and 44 feet in width. It is flanked on either side by the Science Building and the Library. On the right hand side is an iron stairway leading to the roof, which is flat and protected by a low parapet. The original plans were designed by Shipley, Rutan & Coolidge, Boston, and called for an arch 84 feet in height, but owing to the increase in height of adjoining buildings the arch was carried to the additional elevation. The change was made under the direction of Charles E. Hodges, resident architect of the University.

Our engravings were made directly from photographs taken specially for the SCIENTIFIC AMERICAN.



NEW BUILDINGS AT STANFORD UNIVERSITY, CALIFORNIA.

A DWELLING AT NEW HAVEN, CONN.

WE present on page 90 a modern dwelling which has been erected for F. Von Beren, Esq., at New Haven, Conn. The design is attractive and pleasing, and contains many excellent features, among which may be mentioned an effective combination of cobblestone, clapboards and shingles. The underpinning and chimney breast, and also the stonework at piazza, are constructed of field stone laid up at random. The remainder of the building is of wood. The first story is covered with clapboards painted a dark brown; second story is covered with shingles, and stained a reddish brown. The roof is covered with shingles, and then stained moss green. The trimmings are painted Colonial yellow. Dimensions: Front, 38 ft.; side, 38 ft., not including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The house is arranged for two families. The vestibule front hall is finished in quartered oak. The vestibule has a tiled floor and a paneled oak wainscoting. The hall contains an ornamental staircase turned out of similar wood. The parlors, treated with white enamel, with hardwood floors, are separated by an archway, supported upon columns with carved capitals. The fireplace is trimmed with tiled facings and hearth, and mantel of Colonial style, with mirror and columns rising to ceiling. Both rooms have a deep ornamental plastered frieze. The dining-room is finished in quartered oak, in the old Dutch style, with paneled quartered-oak ceiling and a paneled wainscoting six feet in height. The kitchen, pantries, and rear halls are trimmed with North Carolina pine, finished natural. The bedroom is trimmed with ash. The bathrooms have tiled floors and wainscoting and the most approved open nickelplated fixtures. The second floor contains five rooms, trimmed with ash, besides the large closets and bathroom already mentioned. The third floor contains four rooms, two rooms for each family. A cemented cellar contains laundry, furnace, and other necessary apartments complete. Cost, $6,000 complete. Mr. F. Von Beren, of the firm of Brown & Von Beren, 865 Chapel Street, New Haven, Conn., was the architect.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL RESIDENCE AT YONKERS, N. Y.

WE present on page 94 a Colonial residence which has been recently erected for Joseph M. Stoughton, Esq., at Yonkers, N. Y. The exterior is treated in a pure and simple style of architecture of the Colonial order. The structure has some excellent features, among them a pleasant porch and an attractive front door entrance. The underpinning is built of red brick, laid up in white mortar. The superstructure is covered with clapboards on the exterior, painted pure white; the blinds are painted apple green. The roof is covered with metal and then painted with metallic paint. Dimensions: Front, 66 ft.; side, 41 ft., not including piazza. Height of ceilings: First story, 10 ft.; second, 9 ft.; third, 8 ft.; cellar, 8 ft. The interior plan is most excellent. The main hall, square in form, is trimmed with white pine and treated in ivory white. The ceiling has a wooden cornice and a wainscoting. The staircase is a box one, with seat on first landing and newel posts and rail of mahogany at second story. The [illegible]tion-room is treated in an artistic manner, with walls of yellow silk and trimmings of ivory white. It has an open fireplace, treated in a most excellent manner, with tiled hearth and facings and mantel. The living-room is trimmed with ash, stained and finished in black. The ceiling is beamed and ribbed. The fireplace is built of Roman buff brick, with hearth and facings of the same material, and a pillared mantel with shelf.

The dining-room is trimmed with California redwood, and has a paneled wainscoting and ceiling beams, and an open fireplace with mantel of excellent design. The kitchen, laundry, pantries, and rear hall are trimmed with white pine, and are furnished with all the best modern conveniences. The second floor is trimmed with pine and painted white. It contains nursery, sewing room, two bedrooms, and two bathrooms; the last have wainscot-

ings and porcelain fixtures, with exposed nickelplated plumbing. The third floor contains the servants' quarters and ample storage. A cemented cellar contains furnace room and other necessary apartments. Cost, $11,000, complete. Messrs. Brite & Bacon, architects, 111 Fifth Avenue, New York city, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

THE "BREAKERS," AT NEWPORT, R. I.

THE late Richard M. Hunt was pre-eminently a builder of splendid residences, both for town and country, and he may be regarded as even more successful in them than in his public buildings. His career extended over forty years, and during this period he had an opportunity of building many of the more important residences and villas in the United States. It is only necessary to mention "Biltmore," the house of John Jacob Astor, in New York, and the residence of Elbridge T. Gerry, in New York, and the residences of the late Ogden Goelet and the late Cornelius Vanderbilt, and the residence of Oliver H. P. Belmont, at Newport, R. I. We take pleasure in presenting the first of a series of the palatial villas at Newport. The present article dealing with the "Breakers," Newport, R. I., shown on page 89, will be followed by articles on "Belcourt" and "Ochre Court."

The "Breakers" is situated at Ochre Point, and was built to take the place of another superb villa which was destroyed by fire. It is built in the Italian Renaissance style, and is one of the most sumptuous houses in America. It is three stories in height, and in the rear of the main mass the house is projected forward into two pavilions, connected by an open loggia. The porte-cochère in front is penetrated by three arches, and the entrance leads into the main hall, which rises to a height of three stories, and is richly decorated. It is of white marble and onyx, and under the staircase is a beautiful fountain, the hall lighted by four electroliers, and the ceiling is decorated with mural paintings. The carpets, rugs, palms, etc., make it one of the handsomest apartments ever built in this century. The dining-room is even more sumptuous, gold predominating in the decoration. The mantel is of marble and onyx. There are windows on the side, and the room is also lighted by oval windows near the top and by electricity and gas. The door at the left opens into the grand hall. The library is a rich and dignified apartment in dark oak, and the mantel was obtained from Pompeii, and is a fine example of classical workmanship. The salon on the first floor is decorated in the style of Louis XV. in gold and drab, with onyx panels. Among the other fine apartments are the billiard-room, the first story loggia, and the second story loggia. One great specialty of Mr. Hunt's was the designing of fine interiors, and he has certainly succeeded most admirably in the "Breakers," which can hardly be matched for true magnificence in anything which has been built in this country. It is very easy to run into the meretricious where there are unlimited means provided for building a palatial residence, but in the present instance all the decorations are homogeneous.

A MODEL COTTAGE AT BAY RIDGE PARK, LONG ISLAND.

WE present on page 91 a design for a model cottage, which has been erected for the New York and Long Island Realty Company, at Bay Ridge Park, Long Island. The underpinning and stonework, where shown, are built of rock-faced bluestone laid up in a rough manner. The exterior is covered with clapboards and shingles. The clapboards are painted a dull shade of red, while the shingles are stained a dull shade of green. The trimmings are painted white. The roof-shingles are painted red. Dimensions: Front, 28 ft. 6 in.; side, 37 ft., not including piazza. Heights of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. The interior arrangement is excellent. The first story is trimmed with ash. The hall contains an ornamental staircase turned out of similar wood, with newel posts and balusters. The parlor and dining-room are separated by sliding doors, and each has an open fireplace trimmed with tiled hearth and facings and hardwood mantel. The kitchen, pantries, and lobby are trimmed and wainscoted with yellow pine, and are completely fitted up. The floors throughout are laid with narrow yellow pine. The second floor contains three bedrooms, den, bathroom, and large closets. This floor is trimmed with cypress. The bathroom is wainscoted, and is furnished with porcelain fixtures and exposed plumbing, all nickelplated. The third floor contains servant rooms and ample storage. A cemented cellar contains furnace and other necessary apartments. Cost, $3,800 complete. Mr. Henry E. Haugaard, architect, Richmond Hill, Long Island.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A STONE VENEER COTTAGE AT SOUTH HAVEN, MICH.

THE engraving shown on page 92, in this issue, illustrates a summer cottage, which has been erected for L. S. Monroe, Esq., at South Haven, Mich. There is no cellar. The cottage is erected on stone piers and footings under underpinning. The first story is built of a frame of 2 x 6 studs, sheathed on the inside and then veneered with random rock-faced field stone, 12 inches thick at bottom of wall and 8 inches thick at top, secured to the frame by specially designed anchors; this stonework runs from grade line. The whole is pointed in buff mortar. The second story, of wood, is covered with cedar shingles and stained a buff color. The gable cornice is of shingles stained mahogany. The roof is covered with shingles and stained moss green. The trim and sashes are painted ivory white. Dimensions: Front, 30 ft.; side, 43 ft., not including piazza. Heights of ceilings: First story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The reception hall is trimmed with quartered sycamore, and has a paneled staircase of quartered sycamore and maple, of ornamental design. The living-room is trimmed with similar wood, and it has an open fireplace, with a cut-stone mantel of special design, made of gray and red stone. The dining-room is trimmed with yellow pine. The kitchen and pantry are trimmed with similar wood, and are fitted up complete. The second floor contains five bedrooms, one servants' room, and large closets. This floor is trimmed with yellow pine finished natural. Cost, complete, $2,500. Mr. A. M. Worthington, architect, South Haven, Mich.

Our engraving was made directly from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL RESIDENCE AT FOREST PARK HEIGHTS, SPRINGFIELD, MASS.

ON page 93 we present, in this issue, a modern residence, Colonial in treatment, which has been erected for the Forest Park Heights Land Company, at Springfield, Mass. The building is treated in a simple manner, but artistic in detail. It is provided on the exterior with an overhanging cornice with ornamental brackets, an attractive piazza, and numerous bay windows. The underpinning is built of red brick, laid in red mortar. The superstructure is covered with sheathing, paper, and clapboards, painted a pearl gray with white trimmings. The roof is shingled and stained a dark dull shade of moss green. Dimensions: Front, 34 ft; side, 39 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior arrangement is most excellent. The reception room, or hall, is entered through a vestibule provided with a coat closet and doors opening into reception hall and parlor. This reception hall is trimmed with quartered oak, and is provided with paneled wainscoting, ceiling beams and oak floor. The staircase is ornamental, with newel posts rising to ceiling and the spaces between them filled in with a grilled screen. The fireplace has tiled facings and hearth, and oak mantels of Colonial style. The parlor is trimmed with whitewood, treated in old ivory white. The dining-room, trimmed with quartered oak, has a hard pine floor with oak border. The kitchen, pantry, and lobby are trimmed with whitewood, finished natural, and are furnished with maple floors and all the necessary improvements. The second floor is trimmed with whitewood, finished natural, and provided with hard pine floor. This floor contains four bedrooms, large closets, and bathroom; the latter trimmed and wainscoted with oak and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains three bedrooms and ample storage room. A cemented cellar contains furnace, laundry, and other necessary apartments. Messrs. Louis Frank Newman & Carroll H. Pratt, architects, 21 Elm Street, Springfield, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

The Bathroom.

THE past dozen years has shown a great development in the practical as well as in the artistic side of the residence, and comfort and convenience are now considered of far more importance than are style and display.

One of the rooms essentially for the use of the inmates of the home, as contrasted with the parlor, a hall, or dining-room—and yet one that should be made none the less beautiful—is the bathroom. How to give the most attractiveness to this room is the object of this article.

Practically every modern residence has a bathroom, but there are millions of people in these enlightened United States who are still without this important part of a home. People who have money for luxuries that give far less pleasure or comfort erroneously think a bathroom beyond their means. Perhaps a glance at the different phases may change these ideas.

The most serious difficulty is where there is no running water supply in the house or neighborhood. Depending on cisterns or wells for supply, it is necessary to pump water by windmill or a small engine or by hand. The first is the easiest, the second is surest, and the last is the cheapest.

If there be no sewerage system, it will be necessary to arrange a series of distributing pipes, or a cesspool will answer for a small family in a rural district, provided the cesspool is frequently cleaned. The distributing system is much better, however.

The first thing to be decided is the size and position of the room. The former depends on the space you can spare, the number of fixtures to be used, and the amount of money you can afford for walls and floors, within reasonable limits, the larger the room the better, as there is usually insufficient space for moving around. It is most annoying when one must squeeze in a narrow space, or to reach over a wash basin or bowl to reach a cock in the bath tub. Then, too, the larger room allows most perfect cleaning.

The position of the bathroom usually depends upon the arrangement of the first floor, as it is more economical to place the bathroom over the kitchen. This saves in the plumbing, as there is little piping from the boiler, and the waste pipes, or outlets, are in line with the one from the sink.

Being placed over the kitchen is an advantage in winter, owing to the warm floors that invariably are over the kitchen stoves. While not so desirable in summer, a warm bathroom is not such a misfortune as would be a bedroom so situated; one isn't in the bathroom very long.

Also, for architectural considerations, the bathroom is placed on the back or side of the house, allowing the front for the windows of larger rooms.

However, the convenience of the household should not be sacrificed. The room should be accessible from the main hall, and yet should not be so placed that an open door will bring the fixtures into view from the main part of the house.

Do not, unless the bathroom is exclusively for your personal use, have a door from your chamber to the bathroom. It is most annoying to visitors to find that there are two doors, and that two locks must be turned on entering and two bolts be drawn before leaving. Almost surely one lock will be open or closed at the wrong time, and mortification or anger will as surely result.

Of course, for a large house, it is most desirable to have a private bath for one's own use, but most of us cannot afford that luxury.

There should be at least one outside window, and preferably, for ventilation, two windows. These should have ground or frosted or stained glass, or else be covered with washable curtains. Stained glass in appropriate designs, such as birds flitting across a pond, etc., are most attractive, and are quite inexpensive.

Where it can be so arranged, a good substitute for curtains is a screen or network of growing vines. These may be trained to quite closely cover the lower half of the window, but the upper half should be left fairly clear, so that wind and sunshine may enter.

Next to be considered is the heating. The room *must* be warm in cold weather. There is nothing so discouraging as a cold bathroom. Cold coffee isn't half such an affliction. Have the temperature at or above 70 degrees; whether you bathe in hot or in cold water, the room should be warm.

If you have a furnace or fireplace heater, place a radiator or register in this room, being sure that steam pipes are not exposed so that there is danger of blistering one's bared limbs.

If you use open fireplaces or stoves, place a register from the ceiling of the kitchen to the floor of the bathroom. You will be surprised at the amount of heat that will come up from the kitchen.

The floor register is not possible in rooms where there are shower baths, as the water splashed on the floor will run into the register. I recall one fine residence, with all modern bathroom fixtures and with a furnace register placed in the center of the tiled floor. It was to be used after the bath, the owner said, for warming and drying. But when the spray bath was used, the water ran down the furnace pipe, dripping in the butler's pantry, and eventually putting out the fire in the furnace.

Having the room located, the next question is the finish for floor and walls. Undoubtedly the most sanitary and the most attractive thing to use is tiling. For the floor use "vitreous" or "vitrified" white tiles. These are almost like glass, in being very hard and non-absorbent, and yet they have not the shiny, slippery surface of the glazed tiles. Plain white three-inch hexagon tiles, with a narrow color band around the edge of the room as a border, is the most popular arrangement, though occasionally one sees an attractive floor of white octagons with small three-square dots in the corners, formed by the four octagons.

For the walls, use brick-shaped or square glazed white tiles, with a moulded cap and base. Color strips and a border in a shell or seaweed design greatly add to the appearance.

If one cannot afford tiling—the cost will be about $130 for the floor and three-foot wainscoting in a room 6 x 8—if this seems extravagant, a very good substitute for the wall is a hard cement finish, lined off to represent tiling. Or for both floor and walls, use hardwood, thoroughly dried and laid in narrow strips. Linoleum of simple design for the floor, and a similar effect in paper for the walls, give a clean and charming finish at very low

cost. White enamel woodwork is also attractive for walls.

A bath rug, of white, is desirable for the floor, whatever may be the original covering, as bare floors feel "clammy" under wet feet. Japanese fiber rugs are also suitable for the space before the tub, but these cannot be washed as can the white cotton rug.

Last, but by no means least in importance or in expense, come the fixtures. These are usually a wash basin, a bath tub, and a water closet. The latter should, if possible, be put in a separate room.

The style of these fixtures depends on one's taste, and more especially on one's finances. Whether the lavatory bowl be of decorated porcelain and whether the slab be of finest marble, or, on the contrary, of the cheaper materials, see to it that there are no imperfections in the finish or weights. Use no "seconds," and have all weights more than the average. Pipes in the room should be exposed, as there is always a musty smell where they are boxed in. A little thing, but of some importance, is to have the faucets project well over the bowl. It is most annoying to have the water run down the side of the bowl rather than into the middle.

The tub should be on feet, and not enclosed in woodwork. All grades of tubs are now made this way from lightweight "steel" (which sometimes is so thin one could call it "tin") to good copper-lined steel tubs, then iron enameled white, and finally real porcelain. The latter are plain white or elaborately decorated on the outside, and cost from a fraction of a hundred up into the thousands of dollars.—J. Willson, in American Homes.

The Strength of a Brick.

IT is so seldom in modern practice that masonry of any sort is loaded anywhere near to its limit, that we are apt to forget how large a factor of safety has come to be considered wise, and how little reliance is placed upon the innate strength of the units which go to make up the masonry walls. There have been a few cases on record where brickwork has been actually crushed by a load unwisely placed upon it in a building, but, generally speaking, the kind of brick that is considered advisable for use has practically a resistance to crushing so great that the determining factor in the designing of a wall or pier is not the strength of the unit, but rather the lateral stability of the completed structure. Indeed, measured by any tests which we can apply, the most ordinary sort of light hard brick has sufficient strength to satisfy the mere letter of the most exacting building law. This was brought to our notice very clearly a short time since by some tests which were made by Norcross Brothers, the well known builders, in connection with the construction of one of the large buildings in this city. A selection was made of a number of different qualities of brick, ranging from what would be termed a rather indifferent light hard up to a thoroughly hard burned dark brick equal to the best quality which is manufactured. The tests were upon a half brick only, the loaded area averaging 15 square inches. A record was kept of the load which produced the first crack in the material, as well as the ultimate crushing strength per square inch. The former ran from 2,700 lbs. per square inch for the poorest of the bricks up to 8,000 lbs. per square inch for the best quality, while the ultimate strength ran from 3,149 lbs. per square inch for the poorest sample up to 10,532 per square inch for the hardest. Or, reduced to tons per square foot, this means that the poorest sort of brick cracked under the equivalent of a load of nearly 196 tons per square foot with an ultimate strength of 226 tons per foot, while the best sample cracked under 576 tons a foot, and only yielded under an ultimate strain of a little over 758 tons per foot. When we consider that the utmost that the building laws of most of our large cities consider as safe is a strain of 15 tons per square foot on the masonry walls laid up in cement mortar, this unit strain, as compared with the ultimate resistance of the poorest of these bricks of 220 tons per foot, allows for a factor of safety of nearly 15, while in the case of the hardest bricks the factor is over 50.

Now, we would not argue from this that it is perfectly safe to use light hard bricks, or that the wise builder can save the difference in cost between good and indifferent brick and secure just as good a building. As we stated in the beginning of the preceding paragraph, the strength of the wall is not wholly measured by the resistance of the units of which it is composed, but rather by the stability of the whole. Our modern methods of scientific analysis have enabled us to sometimes shade construction within some pretty perilously close scientific limits, and we cannot afford to take the chances of poor workmanship or unexpected concentrated loads and trust to anything but the best bricks for first-class building. Still it is a satisfaction to the architect or constructor who is at the mercy of a careless or indifferent workman to know that if a brick pier is built up reasonably well, the material itself is innately so strong that there is very little risk of failure.

In this connection we recall the case of a large building erected some distance from Boston, in which, by an oversight, the piers supporting an enormously heavy tower were built of a size which seemed so small as to arouse the fears of a constructor, who, to set his mind at rest, made some practical experiments on piers of the full size of the ones in the building, constructed in the same manner, which he loaded to destruction, after allowing ample time for a good hard set in the mortar. We have not the figures at hand to give the crushing strength of the pier, but as a result of these experiments the builder felt there was not the slightest risk in loading good brick piers to 25 tons per square foot.—The Brickbuilder.

Gilding: Its Use and Abuse.

IT is an unfortunate fact, but the modern decorator abuses the art of gilding. He seems to regard it as something to be used on every possible occasion, both inside and outside the building, and the result is that the streets are full of tawdriness and rooms have a glaring and inappropriate appearance. Gold should be used sparingly and with great discretion. The very fact that an article of one material or another is gilded to make it represent something which it is not, is a strong argument in its disfavor, though the employment of thin gold leaf to imitate an object made of solid gold might perhaps be less objectionable than the graining of, say, a deal door to make it look like an oaken one. But putting æsthetic principles aside for the moment, and considering the matter only from the standpoint of fitness, surely the proper application of gold leaf is a matter which seems hardly to be thought of. This abuse of gilding is perhaps carried to its greatest extent, internally, in such places as restaurants and hotels, and as these form a large item in the list of commercial buildings, the practice is the more to be condemned. It would be futile to attempt to enumerate here any rules of gilding, or to suggest what particular portions should and should not be so treated; our object is simply to point out the abuse and to try to abate it. By many mechanical so-called decorators it seems to be thought an axiom that, when the cost allows it, such parts as the caps and fluting of pillars and pilasters, cornices, etc., should in all cases be gilded, and very often one sees gold introduced largely in the wallpaper. Gold—that is, imitation gold is not to be used haphazard and indiscriminately. For some purposes it is admirable, but they are few in number. The ordinary picture-framer encloses all his pictures in gold frames; the more capable and artistic craftsman appreciates the value of plain frames for some subjects. This serves as an example to show what is needed—a more discreet application of gold leaf. In speaking of this matter, it might be well just to refer to those external disfigurements of our architecture—the mammoth gilded letters. The offensiveness of these does not need to be pointed out to anyone possessing the least feeling for harmony or artistic effect. We do not say that they are rendered objectionable entirely by the gilding, but that this aggravates their appearance. —The Builder's Journal.

Wall Paper for Cottages.

A DEPARTURE from the conventional rules for wall papering is admissible in cottages that serve only as summer homes. The reason is apparent when one gives a thought to the comparatively short period of time in which houses of this kind are occupied, the coming and going of different guests, and the absence of the permanent decorations of the city residence. These three elements, then, are the guide to a choice of certain daring color effects and striking designs, a combination that conduces in a great measure to unique finishing, says the New York Sun.

The wall hangings and wood finish, to be happily united, must be planned while the house is in the hands of the builder. Situation, environment, use and artistic merit may then receive their due value with a greater certainty of reaching ideal results. As a preparation for the right selection of wood, the wall papers themselves may be turned to as teachers, and among the unnumbered varieties made nowadays some are distinctive enough to suggest their own accompaniments of wood-work and furniture.

Backgrounds, in general, make their own plea for a duplicate setting of wood-work. White paint is demanded by flowered designs printed upon white ground. A quiet-toned paper applied to a room flooded with sunlight or exposed to a glaring water view, requires a soft, dull paint on window casings and doors.

Southern pine rubbed down with shellac is often adopted for the interior finish of cottages. To offset its monotonous appearance the wall papers should be chosen for their variety of expression, with due regard to the tone of their setting. Different shades of yellow—cream, buff, canary, buttercup—may be united with blue or green, and the latter color used alone. Reds need to be avoided.

Picture papers carry a decorative charm that will pleasantly characterize the walls of the summer cottage. "The Troubador" in its white and green printing makes a cool, fresh and comfortable-looking wall hanging for a music room. For accessories it suggests white woodwork, muslin curtains, a green carpet, and willow furniture.

As a contrast to the heat of summer and the pervasive outdoor greens, there is winter landscape in deep blue and white that speaks for white enameled furniture in a bedroom. For the dining-room a high dado could be made of a Dutch landscape showing windmills. A plain paper above would graphically outline some pieces of china. A novel design of the favorite pine cone motive is made in brown and blue, and indicates the use of the two colors in oak furniture and azure window draperies. A pear blossom pattern on a light green groundwork can be applied to bedroom walls, and the blossoms adopted also upon the toilet china and bureau linen.

For a north room a good choice is one of the full-blown red roses on a white ground. Curtains for bed covers and chair cushions can be matched in color and design with excellent effect. Two flower papers vivid with summer loveliness, and novel in conception, are those of pink poppies and daisies, and purple lilacs. An entertaining wall covering for a reception-room is a reproduction of colonial scenes, and for the dining-room the English hunting scenes.

For the single chambers of a cottage there is a call for a paper with a fine, almost indistinguishable figure. The armure printed in two tones of one color meets most closely this special need, or, for a substitute, a small geometrical design made for ceilings. The picturesque outlines of the sharp-pointed roofs of a cottage offer a distracting problem when the treatment of the inside walls is attempted. The difficulties of frieze, molding and dado can all be obliterated by selecting a small pattern without perpendicular lines and hanging it over side-walls and ceiling. A rose climbing over a trellis, or flower powdered thickly, are charming used in this manner.

For every artistic or utilitarian need of the cottage walls there is a superabundance of happy ideas, varied colors, clever designs, that will contribute more than any other feature to the interior delights of the summer home.

Fireproof Material in Germany.

A NEW industry has lately been introduced into this city which deserves creditable mention, and promises to be a great commercial success, says Consul E. T. Liefeld, of Freiburg.

The business pertains to the treatment of cottons, linens, woolen goods, etc., or any article of fibrous or textile nature, by a chemical process which renders such articles fireproof.

When we consider the amount of property which has been destroyed by fire, and the thousands of lives that have been lost in the flames, we can readily imagine the great benefits and advantages that come from such a discovery. Many a hotel would not have been destroyed if the lace curtains had not caught fire, and many a home would still be standing had the carpets been fireproof. The terrible holocaust at the charity bazaar in Paris a few years ago could not have occurred had the curtains, buntings, and decorations generally been made of fireproof goods; and it is even possible that many of the unfortunate victims would have escaped unhurt had their clothing been fireproof.

As is well known, the substance usually employed for the manufacture of fireproof clothing, paper, theater curtains, etc., is asbestos, a mineral silicate, a variety of hornblende, which can be woven or otherwise prepared, and is infusible at ordinary temperatures; hence soiled articles made of asbestos need only be thrown into a fire to be cleaned. Asbestos has, however, several great disadvantages, viz., its high price and its great weight, the specific gravity being about 3.

In this new method, the goods that are to be rendered fireproof are treated chemically by a very quick process, which does not act on the fiber; so the goods lose nothing in strength, nor does the treatment in any way affect the color or perceptibly increase the weight, and the advance in the price of the article is very little.

I procured some samples and tried a few experiments with cloth which had been made fireproof by this new process, and found that no flame or fire is produced, as was the case with similar goods which had not been so treated. Only where the candle flame came into direct contact with the cloth was the fiber charred; but there was no spread of fire, and as soon as the flame was removed the charring ceased. I poured some kerosene oil on a piece of the cloth and ignited it; the oil burned vigorously, but the cloth was simply charred where it had been soaked with oil, and there was no spread of fire. A piece of wood wrapped in thick fireproof canvas was placed for a few moments on the red-hot anthracite coals of a furnace, and when examined was found to be uninjured, except where it had been in direct contact with the coal.

It would seem from these experiments that such a fireproof article would be very serviceable for the storing or packing of explosives. There appears to be no reason why the wood used for building purposes can not be impregnated and rendered fireproof.

There is one disadvantage connected with this discovery which prevents the use of these fireproof articles for outdoor purposes, viz., that water can dissolve the chemicals, and then the substance is no longer fireproof,

but as such material can be washed and then reimpregnated very easily and cheaply, and so again rendered incombustible, it would seem that this does not greatly depreciate its value. Steam and moisture do not affect the fireproof qualities, nor does the application of heat; it is also claimed that the manufactured article is not in the least poisonous.

I have learned that the increase in price to the consumer of the fireproof article need not be more than about 15 pfennigs per square meter, or about 3 cents per square yard, over that of the unimpregnated, and in large quantities the difference would be even less; and the difference in weight is such that a piece of flag material weighing before treatment 130 grams per square meter would weigh after impregnation from 140 to 150 grams, which means only from 10 to 20 grams per square meter more. If we consider 500 grams to the pound and 1⅛ square yards to the square meter, this would mean an increase in weight of only 1 pound for about every 50 square yards of material. For other goods, the average increase might be even less.

Although this fireproof industry is new here, the firm has been in existence for several years as manufacturers of waterproof articles, such as horse blankets, tenting, etc., and has been experimenting in the fireproof line of work for a long time.

Painting Brickwork.

This is a matter which has not been given any considerable attention. Just how much good a coat of paint adds to brickwork is not so widely known. However, it is not difficult to distinguish between the painted and the unpainted brickwork, and it is not hard to see the improvement which the paint makes upon the brick.

Before applying the first coat to brick care should be taken to clean the surface to be painted. The best priming coat for this work consists of glue size and venetian red mixed in the proportion of ten to one. Oxide of iron paint mixed with boiled linseed oil also forms a good priming coat, and a little drier can also be added to this.

In applying the priming coat care should be taken that it be well brushed on. The paint should not be too thick when applied. As soon as the priming coat has thoroughly dried, and all the joints and cracks have been puttied up, the second coat can be applied. For the coats after the priming coat, venetian red mixed with linseed oil and drier is used; considerable turpentine is also used, especially in the final coat.

The surface of the painted brickwork is perfectly flat, and to effect this but little oil must be used in the last coats. An excellent final coat for this work can be made by mixing brickdust with venetian red and ocher, using varnish and turpentine. In this no oil is used. It is the brickdust that gives the surface a natural appearance. After the wall has been painted, attention must be given to the joints. This may be painted either in white or black. This is rather fine work. A straightedge and seamer are used in this work. There are many things in painting the joints in brickwork which require more than ordinary precaution. In this work the horizontal joints are usually painted first, and then the vertical ones are filled in. It is a mistake to attempt to paint these joints directly upon the mortar joints. If this is attempted the result will be far from satisfactory. By painting just a little beneath the mortar joints far better results will be obtained. By doing this it will be possible to get a uniformity in the work, and a satisfactory job will be the result. In some cases the joints are painted in oil colors, and a glossy finish is the result, but this is not so much to be desired, especially with a dull surface like brickwork.

Oil must be used in the first coat of paint for brickwork, for it is the oil which forms the material which binds the pigments together. Certainly brickwork must be perfectly dry when the paint is applied, for otherwise it would scale off. If the proper precaution is observed in painting of this character there will be little cause for complaint, and the protection added to this kind of work by paint is almost as great as is the protection added to woodwork.—Journal of Building.

Wire-Nails.

In estimating the cost of work it is necessary that the approximate amount of nails required to complete the work should be known. Since the introduction of the wire-nail the number of nails required to do a given piece of work is not the same as when the barbarous "cut-nail" was in vogue, therefore the rules given for the latter will not apply to the former. The table given herewith is nearly correct, and is based on experience. For 1,000 laths it takes 5¾ pounds wire lath-nails; 1,000 shingles, 5 inches to weather, 5 pounds shingle-nails; 1,000 feet 6-inch sidings, 18 pounds 2½-inch wire-nails; 1,000 feet common boarding, 20 pounds 2¾-inch wire-nails; 1,000 feet rough boarding, 22 pounds 3-inch wire-nails; 1,000 feet square-edge 1-inch flooring, 36 pounds 3-inch wire-nails, 1,000 feet square-edge 2-inch flooring, 40 pounds 4-inch wire-nails; 1,000 feet matched flooring, blind-nailed, 31 pounds 3-inch wire-nails; 1,000 feet furring, 1 x 3 inches, 42 pounds 3-inch wire-nails; 1,000 feet furring, 1 x 2 inches, 60 pounds 3-inch wire-nails; 1,000 feet pine finish, 26 pounds 2½-inch wire-nails; 1,000 feet hardwood finish, 20 pounds 2¼-inch wire-nails; 1,000 feet studding in walls, 10 pounds 3-inch wire-nails; 1,000 feet rafters, cellar-beams, 8 pounds 3-inch wire-nails: 1,000 feet common fencing, 12 pounds 3-inch wire-nails; 1,000 feet pantry fittings, shelves, hooks, strips, and similar work, about 5 pounds 2-inch wire-nails. These figures are very nearly correct, sufficiently so to answer the purpose of the estimator. Of course, if the sizes of the nails are changed—larger or smaller—the figure must be changed to suit.—The Carpenter and Builder.

Practical Gasfitting.

The first thing to be done when fitting up a house is to be sure that the plans are properly marked, and that every light desired by the owner is marked thereon. One will usually be well paid for the trouble if he call upon the wife of the owner and look over the plans with her, calling attention to each light and questioning whether or not it is located so as to give the best possible service. It should also be ascertained what kind of mantels are to be used. Those of extra height or having mirror cabinets should have the gas opening of the jambs placed on the side of the jamb and facing at right angles to the face of the mantel. It may be that the owner has some antique dresser or odd piece of furniture that would require special arrangement of lights, such as an extra wide mirror or one of unusual height from the floor. Ordinary bracket dresser lights should be about 4 feet 9 inches from the floor; hall brackets, 6 feet; mantel brackets, 5 feet; bathrooms, 6 feet; alcove lights, 4 feet 9 inches, and attic or short story lights placed as high as the ceiling will permit, not going above the schedule heights. Care should be taken not to locate bracket lights where doors can be opened against them, as the least damage that can result from such errors is the breaking of a globe or bracket. Many fires have been started in this manner. Newel post lights and those for dining-room sideboards, as well as kitchen lights, when the kitchen is only one story, are, as a rule, supplied by a branch from the riser in the basement.

On general principles it is better to use a 10-foot pole for centering rooms, even if you have to measure it off yourself. A tape-line often has a little off at the end, which you forget to allow for, or the figures are dirty. A gasfitter cannot keep a line clean, and for that reason he usually has a cheap one that will not bear washing, and which also stretches more or less. Stepping off measures with a pocket rule is bad practice, as there is not always a place to mark, and one is apt to lose or gain on the actual distance. Measuring with the pole is more accurate and quicker work, and there is no chance of mistakes by holding the end at the wrong place—something which often occurs when a helper is depended upon to hold a line.

Locate the riser of a job as near to the service pipe as convenient. If the main is in the street put the riser close to the front; if it is in the alley at the rear put the pipe as far back as circumstances will permit. Never locate the riser in the outside wall of a frame house. Make the riser long enough to extend about 6 inches below the first floor joists. A central location of the riser is often recommended by fitters, on the ground that it saves big pipe. This is a mistake. The riser must be carried to the center, either down stairs or up, and, in addition to that, big pipe must be run both ways, front and back, on the upper floor, when the riser is centrally located. It does, however, sometimes save cutting joists equally and in undesirable places.

Locating the Lights.—In centering parlors or other rooms having sliding doors, remember that one of the partitions between which the door will slide is likely to be of studding, and is seldom in place when the house is measured for gas pipe. For this reason, if the fitter is not careful, he will get the drop in one side of the room, by centering without allowing for the partition not yet erected. When locating pipes, partitions, or centers on the plans for any purpose which brings the relative positions of other rooms, either above or below, into consideration, always measure the outside face of the walls, as this is regular and free from jags or off-sets generally. When centering rooms in the building itself, always take care to allow for off-sets in the wall; the walls on one or more sides of a room may offset between the floor and the ceiling, thereby making the room in which you are measuring larger than the one which it is intended to have the pipe in the center of. Remember, when allowing for a stairway or hall partition cutting off one side of room, that 1 foot variation in the location of the drop will compensate for 2 feet off the room, and that an off-set of 4 inches in one wall only requires the drop to be 2 inches out of the true center of the room as measured before.

It is not always proper to put lights in the exact center of rooms, regardless of surroundings. Pay no attention to a joist throwing a drop an inch or so out of the way. Chimney breasts, or any minor extension of, or projection into, rooms should not be regarded when centering. Put the light in the centre of the space bounded by the principal walls. If slightly removing the drop from the center of a room will bring it in line with the drop in the center of another and more prominent room, it is sometimes a good idea to do so, especially if there are sliding doors between them. Having the fixtures even with each other makes a better appearance than otherwise when the doors are open. In the case of dining-room drops, the fitter will have to be guided by where the table will be placed. If the room is of ample size, and there is nothing to prevent the table from being placed in the center, then locate the drop in the center of the room, or with reference to the position of the drop of one of the other rooms, as before suggested, if thought best.

All bracket openings for the second floor of a building in coal and water gas work are usually taken from the pipes which supply the drops and brackets of the first floor. This saves running a large pipe up to the third floor and through the third floor joists, and it takes a shorter piece of pipe to reach the proper height from the second floor than it would to come down from the third, especially when the ceilings are very high. Then, too, there are often two bracket openings over each other, so that one run of pipe over to the wall will answer for two lights, while if they were run separately it would take two pieces. The first floor lights are run down from the second floor instead of up from the cellar, because they are few in number, and the fitting from the pipe from the basement up to the different points would entail greater cost. When there is no more pipe needed to do so, route the pipe so that the branch pieces to the drops will travel some distance parallel to the joists. In this way there is a chance to swing the pipe back or forth a little if it does not come in just the proper place.—Sanitary Plumber.

How to Light a House.

Half the trouble with modern eyesight is said to be due to the fact that people now do so much of their work indoors where the houses are imperfectly lighted. If this is so, and there is probably more than a grain of truth in it, it behooves us to look well after our artificial lighting.

Nearly all houses now are lighted either with gas or electric light, and the proper placing of the fixtures determines whether the place is well or ill illuminated. In the house where lamps are used they cannot be conveniently carried about and placed in the positions where they will be most useful. Even in that case it is useful to have a bracket for the accommodation of the lamp in the neighborhood to be lighted, for the mantel or table is not always sufficiently convenient.

It is always much better to have the location of the lights arranged for when the pipes or wires are put in. If the owner of the house means to occupy it, his wife should go over the building and indicate where she will need special lights. She will probably begin with the cellar, her first request for a fixture being for one near the furnace, which is generally in an unlighted portion of the cellar and always requires some attention at night. Another light will be asked for to show up the interior of the preserve room in the cellar, and another one near the stairs. In the kitchen there may be a drop light in the center of the room, with a fixture at the sink where dishes are to be washed and such serious work to be done. If there is a large pantry near the kitchen it should be provided with a light too, for it is unreasonable to expect the servants to spare the dishes and be economical with sugar and spices when they are compelled to calculate locations and quantities in the dark. If there is a butler's pantry, it too should be provided with lights. In the dining room a large light over the center of the dining room table is not only an economy but a necessity.

In sitting room or parlor the tendency is to light the rooms from the sides rather than from the central chandelier that used to be so popular. In the bedrooms brackets at each side of the dressing table mirror are required. The others may be arranged according to taste and convenience. The lower hall is generally supplied with a lantern light and with brackets at each landing on the stairway, the upper halls being similarly equipped. Many of those who have used electricity claim that nothing would induce them to do without it, while others are very unfavorably disposed toward it, saying that the strong light is very bad for the eyes. Electric light may be obtained in almost any town of considerable size by consultation with the local company. Even when electricity is used for lighting it is just as well to be supplied with gas or lamps for emergency, as it is very likely to fail at some time when it can least be spared.

When the electric light wires are put into the house it is always wise to have them indorsed by the insurance underwriters before they are pronounced satisfactory. The uncertainty of the electricity makes it absolutely necessary that the wires should be well guarded, so that in case of an accident there can be no danger of their setting fire to the walls. The company always examines and tests the wires before they are pronounced complete, but it is just as well to have them indorsed by the company by which the house is insured, and thus avoid the danger of any later and serious objections on its part when there is an insurance to be collected.

There is nothing so noticeable as the artistic construc-

tion of the modern house lighting fixtures. This is due in a measure to the impulse given to household decorations by local and national societies. The beauty of the hall lanterns challenges admiration. Some of the handsomest of these are of iron, wrought into intricate patterns with a skill that would reflect credit on one of the great smiths of the middle ages whom Sir Walter Scott paints picturesquely in his novel, "A Fair Maid of Perth." These lanterns are lined with colored glass and fitted with chains, so that the light falls with a soft and mellow beauty on the rather severe aspect of the entrance room.

The side brackets are equally handsome, the shades that accompany them being of the finest and most artistic patterns in glass, frosted, cut or colored, and sometimes blown into the shape of garden flowers.—Francis Hyde, in Washington Star.

Stains for Wood.

THE following recipes for stains for imitating various woods are given by Oils, Colors, and Drysalteries :

1. Lemon Wood—This can be imitated by immersing sycamore wood in a hot solution of gamboge in turpentine.

2. Coubaril Wood.—Maple, sycamore, or beech is dyed in a hot decoction of logwood or Brazil wood and then washed over with sulphuric acid.

3. Black Ebony.—(a) after saturating the surface of the wood with a solution of sulphate of iron let it dry and then apply a hot decoction of logwood and nutgalls till the required tint is obtained. When the surface has dried, wipe off all superfluous dye and finally polish with linseed oil.

(b) Immerse beech, plum, pear, alder, lime, sycamore, or plane tree wood in a hot infusion of logwood. When dry mordant the wood with a cold solution of acetate of copper.

(c) Immerse the wood in a cold solution of the sulphates of copper and iron acidulated with oil of vitriol. When the wood is sufficiently impregnated with the mordant, place it in a bath containing pyroligneate (crude acetate) of iron, logwood, and gall nuts, and heat to 60 degrees to 100 degrees C.

4. Red Ebony.—Sycamore previously mordanted with alum is steeped in a hot decoction of Brazil wood. When the surface is dry apply a cold solution of copper acetate.

5. Jacaranda or Violet Wood.—(a) Immerse walnut, alder, cherry, or beech in a hot decoction of Brazil wood and potash. Put in the black veins afterwards by means of a brush charged with solution of sulphate of iron.

(b) Soak pear, beech, ash, elm, alder, poplar, or birch for twenty-four hours in a hot solution consisting of walnut shells, five parts; acetic acid one part; water, eighty to one hundred parts. Finally dry in the air.

6. Lignum Vitae.—Having steeped plane, sycamore, or beech in a hot decoction of madder, apply oil of vitriol and wash as soon as the desired effect is obtained.

7. Mahogany (Light) —(a) Prepare a tincture with dragon's blood four parts, washing soda one part, methylated spirits sixty parts. This may have to be strained. Apply it to the wood, previously wetted with dilute nitrous acid and allowed to dry. One or more applications must be made, according to the particular shade required.

(b) Immerse sycamore or maple in a hot decoction of brazil wood.

(c) Treat cherry wood with lime water for twenty-four hours, and then steep it in a hot infusion of mahogany sawdust.

(d) Immerse sycamore or lime in a hot decoction of madder.

(e) Walnut previously passed through nitric acid, or which has stayed some time in strong lime water, is dried and polished with oil colored with orchil, and then varnished with red varnish. This recipe is said to give specially good results. Walnut is a wood closely resembling mahogany in the grain, so that it lends itself to the purpose with particular readiness.

8. Mahogany (Fawn).—Steep maple or sycamore in hot infusion of logwood.

9. Mahogany (Red).—Immerse white walnut in a hot decoction of Brazil wood, or sycamore in a hot infusion of annatto and potash.

10. Mahogany (Dark).—(a) Boil 1 lb. of madder and ¼ lb. of logwood chips in two gallons of water, and apply the hot liquid thoroughly with a brush. Then allow the surface to dry, and go over it with a solution of 1 oz. of pearlash in a gallon of water.

(b) Put poplar, acacia, alder, or lime into a hot decoction of Brazil wood and madder.

(c) Make a tincture by dissolving four parts of dragon's blood, two parts of alkanet, and one part of aloes in 120 parts of spirits of wine. Apply this to the wood with a brush.

(d) Steep chestnut in a hot solution of gamboge.

(e) Steep sycamore, beech, or cherry in a hot decoction of logwood. The last two woods should be first mordanted with lime water.

11. Oak.—(a) Boil 10 oz. of vandyke brown, 2 oz. bichromate of potash, 2 oz. washing soda, and 4 oz. of carbonate of ammonia in a gallon of water for seven or eight minutes. Apply the solution obtained to the wood.

(b) The appearance of age can be given to new oak wood by exposing it to ammonia gas. To imitate old oak on ash, elm, box, alder, chestnut, maple, yew, or sycamore, acetate of iron, or nitrate of copper, or both can be made use of. The tints can be varied at pleasure by using the metallic salts separately or mixed, and by giving them various degrees of dilution. They should be used cold. Weak solutions of acetate of iron give green shades, and stronger ones various hues of brown, darkening as the concentration of the iron salt increases.

12. Rosewood.—Boil 1½ lb. of logwood chips in a gallon of water until the volume of the infusion is reduced to two quarts. Apply this boiling hot. If more than one application is necessary, the wood should be allowed to dry before a fresh brushing over is done. The finished surface must be grained with a camel's hair pencil dipped in logwood infusion containing the sulphates of iron and copper.

An Efficient System of Garbage Collection for a Small City.*

BY COL. EDWARD KITTILSEN.

THE scientific men of this country have given great thought to all kinds of improvements in manufacturing and science, but have not given enough thought to the garbage question.

I have been requested to give my views on the collection of garbage. First, the housekeeper is responsible for the care and collection of garbage, and as garbage originates in every household, the housekeeper and servants should be properly taught how to care for and dispose of same.

The garbage or kitchen refuse should be placed in galvanized iron receptacles, each holding not less than three gallons nor more than ten gallons, with a tight cover. Garbage should be kept separate and never mixed with ashes, rubbish, tin cans, broken glass, crockery, rags, etc.

Ashes should be placed in galvanized iron receptacles, holding about thirty-two gallons, not using a wooden barrel or box, as there is danger of fire from hot ashes. Rubbish and other refuse matter should be placed in boxes, baskets, or any receptacle not too large for one man to handle, and should be placed in a convenient place on the property line, so as to be ready for the scavenger at the time collections are to be made. It should be unlawful to cast or throw any filth, garbage or refuse matter of any kind into any street, court, lane, alley, market-place, wharf, dock or sewer inlet.

No person should be allowed to collect or remove kitchen garbage and offal from any dwelling, hotel, restaurant, or other building, or convey the same through any of the streets, lanes or alleys of the built-up portions of the city, except it be collected and removed in water-tight steel or iron-bodied carts, wagons or other vehicles, and securely covered, so that none of the contents shall fall, leak or spill therefrom, or be exposed to public view.

For many years in the early history of the city of Moline up to 1882, all garbage and refuse matter was taken to the river front at the most convenient point, or taken to the outskirts of the city and dumped on any vacant ground, the people getting rid of the kitchen refuse the best way they could. In 1883 signs were put up preventing dumping along the river front, and regular dumping places were established by the city authorities. Under the board of health, in 1882, the sanitary work in reference to the care and disposal of garbage was started. It was ordered that kitchen garbage be deposited in tight receptacles with a cover, and the property holders directed to remove the same at their own expense. This order was never complied with.

In 1883, the mayor ordered the city marshal to have the garbage and filth removed from the alleys at the expense of the city, which was done in the following manner: Water-tight boxes, or tanks, with tight covers, were made and placed on common farm wagons. In this manner the garbage was gathered and hauled three miles into the country and buried. This system was carried on for several years. Garbage collected in districts not having any sewer contained from one-half to two-thirds water. This was expensive to bury, especially in soil that is composed of yellow clay.

In 1894, for the purpose of getting rid of the water, I tried an experiment which proved to be a success. I constructed a tank similar to a mortar-bed used by masons to slake lime in, only on a larger scale. In one end of this tank I placed two sets of one-half inch screens, so as to allow nothing but water to escape. This was then connected with the sewer, and water connections made with the city fire hydrant and a 2½-inch hose, with a 1½ inch nozzle. The wagons were backed up to this tank, the garbage dumped into it, and a stream of water turned into the garbage, and it was thoroughly washed. It takes ten or fifteen minutes to wash each load by this process. The putrid matter is dissolved, and the garbage becomes almost odorless. The water passing from the tank through the screens into the sewer reduces the bulk and weight of the garbage. The garbage is then sprinkled with lime or other disinfectant. After the garbage has gone through this process, the weight is reduced, as well as the quantity, so that from eight to fifteen loads dumped into the tank have been loaded on one wagon and taken into the country by one team of horses, thereby being a saving in which two teams could do the work that formerly took five, and, having no water to bury, also made a greater saving.

In the spring of 1895 the old garbage boxes were worn out, and it was impossible to keep them odorless by scrubbing with disinfectants after each load. They were a nuisance upon the streets and were abandoned. They have been replaced by four odorless, steel-bodied, sanitary dump-carts. This is the most perfect vehicle designed for gathering and transporting offensive material in a healthful manner through city streets. They can be kept clean and odorless at very small expense. The carts hold fifty-four to sixty-four cubic feet each.

Dry refuse, ashes and rubbish are gathered in common dump-carts and removed to the city dump, which is covered daily with earth.

Garbage is taken only from private families by the city. All business houses, hotels and restaurants take care of and remove their own garbage.

The city contracted for and had two crematories built—one for the cremation of garbage and one for the cremation of night soil, but did not accept them on account of their not being able to fulfill the contract.

Destroying garbage by cremation in any furnace that has yet been constructed is not an economical plan, for the expense of operating it is too great for any small city, or even large cities. There is a fortune to be made by the person who invents a furnace which can burn garbage at a small expense, so as to be within the reach of all cities. It is a fact that it is one of the most sanitary ways to dispose of garbage.

Burying garbage is the cheapest as well as the sanitary way to dispose of it, if the cities have the ground for the purpose. The cheapest method known to dispose of garbage and night soil is by dumping it into our river; but it is a barbarous way, as it pollutes the water for the cities situated farther down which depend on river water for drinking purposes, and there should be legislation against this practice. I might say right here that the city of Moline does not allow anything to be dumped into the river.

It has cost $6,012.97 to collect the garbage, consisting of kitchen refuse and all rubbish and waste material from the residence portion of the city, being an area of 2,180 acres, with a population of 21,000. In doing this work we have used four sanitary dump-carts for removing dry rubbish, street sweepings, with nine horses and twelve to fourteen men. The above cost includes the cost of covering the city dumps with earth, also the sweeping of two and one-half miles of brick pavement.

We have collected the garbage over the entire city twice or three times a week daring the summer months, and once or twice during the winter months. We can remove garbage at less expense in the winter than in summer. In the winter garbage can be deposited in boxes or old sugar barrels, as it will freeze, and when the receptacle is full it is thrown upon the cart, and the box or barrel, with contents, taken away, the property-holders placing another receptacle in its place.

It is folly for the city to clean up in the summer and let a winter's accumulation remain until the frost is out of the ground, and the ground saturated with filth and foul matter which will breed disease during the hot summer months.

The city of Moline owns the horses, carts, vehicles and tools which are used in the health department for cleaning the city. I believe Moline is the only city in Illinois that owns a complete equipment for cleaning the city.

It is my opinion that with the use of the sanitary garbage carts, and with the galvanized iron receptacles for depositing garbage by the householder, and with the necessary dump carts to handle dry rubbish, the garbage being taken by the sanitary carts to the tanks, or tank, located at some convenient place, there washing the garbage thoroughly, allowing the fluid to run into the sewer, the residue or solid matter to be hauled out of the city and buried, is the cheapest and most sanitary manner of collecting and disposing of garbage.

What is the best way to collect and dispose of garbage, rubbish, filth, offal, etc.—at the expense of the city, or to compel the property-holders or tenants to do it at their own personal expense? From my experience, I will answer, *by the city*, as viewed from a sanitary point. Why? Because just as soon as the people are obliged to remove it at their expense, they will not remove any if they can help it. They hide it, dump it into vaults, throw it into sheds, under buildings, or anywhere out of sight. I do not say that all do this, but some do. If the city does the work, the people will bring all filth or rubbish to light and clean up their property and keep it in a sanitary condition.

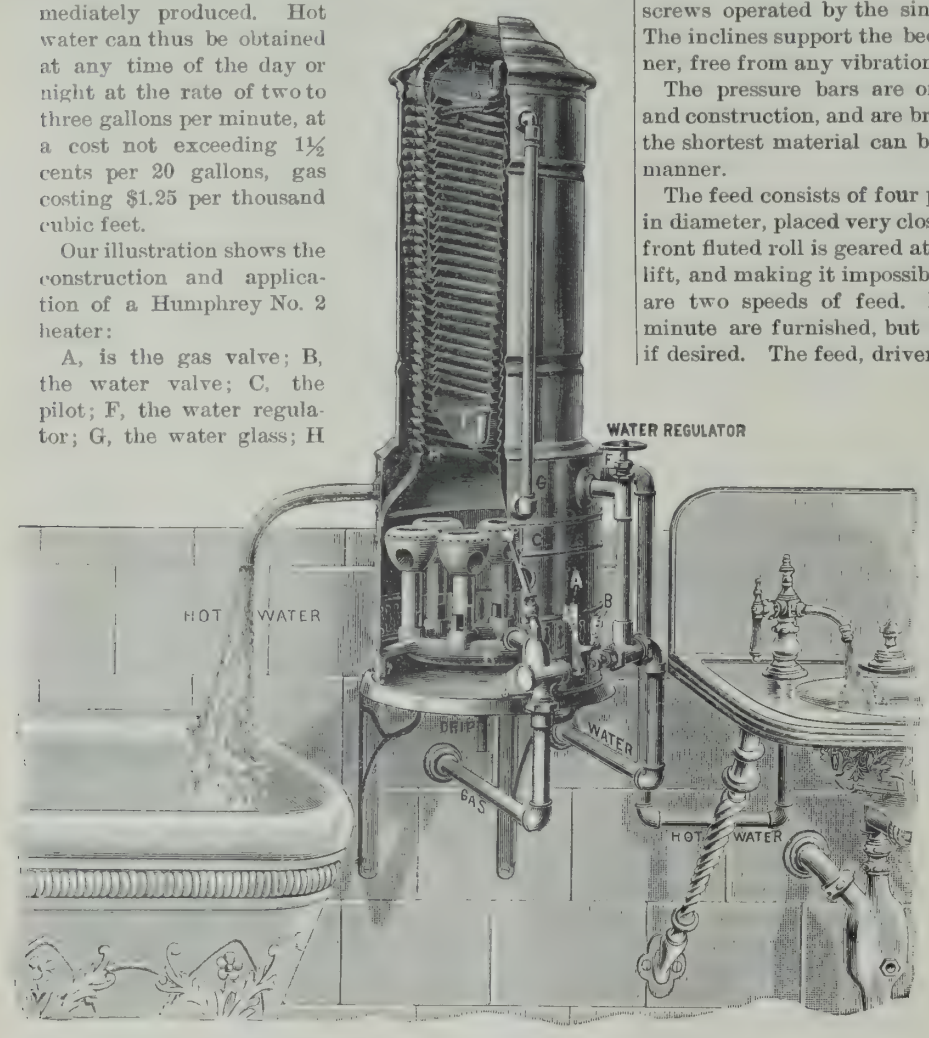
* Condensed from paper read before the Illinois Society of Engineers and Surveyors, by Municipal Engineering.

HUMPHREY INSTANTANEOUS WATER-HEATERS.

THE instantaneous water-heaters made by the Humphrey Manufacturing and Plating Company, Kalamazoo, Mich., U. S. A., are designed to use gas. Large burners and a large copper heating-surface are provided, so that as soon as the gas is ignited a stream of hot water is immediately produced. Hot water can thus be obtained at any time of the day or night at the rate of two to three gallons per minute, at a cost not exceeding 1½ cents per 20 gallons, gas costing $1.25 per thousand cubic feet.

Our illustration shows the construction and application of a Humphrey No. 2 heater:

A, is the gas valve; B, the water valve; C, the pilot; F, the water regulator; G, the water glass; H and I, corrugated tubes; J, the cold water supply; K, the burner ring; L and L, burner pipes.



THE HUMPHREY INSTANTANEOUS WATER-HEATER.

In order to obtain hot water the pet cock is turned and the pilot C ignited. The duplex gas and water levers, A and B, are then opened, whereupon the gas immediately passes into the burner ring K, into the large burners L, and ignites without any noise or danger of explosion.

The water passes through the regulating valve, F, and up the pipe to J. It is then poured upon the spirally corrugated copper tubes, H and I, distributed over the entire heated surface, and delivered into the bath tub. The temperature of the water can be regulated by means of the valve, F.

It will be readily seen that by spreading a ½-inch stream of water over the 11 square feet of heated surface in the heater, the water must be quickly heated.

The large burners prevent the explosive noise which other heaters make.

There is no limit to the quantity of hot water; the apparatus heats the water while it is passing through the heater, so that a continuous stream of hot water is obtained as long as the gas and water are turned on.

IMPROVED HEAVY PLANER AND SMOOTHER.

WE here present a cut of a machine manufactured by the Egan Company, of Nos. 209 to 229 West Front Street, Cincinnati, Ohio—a machine which will form part of their exhibit at the Paris Exposition.

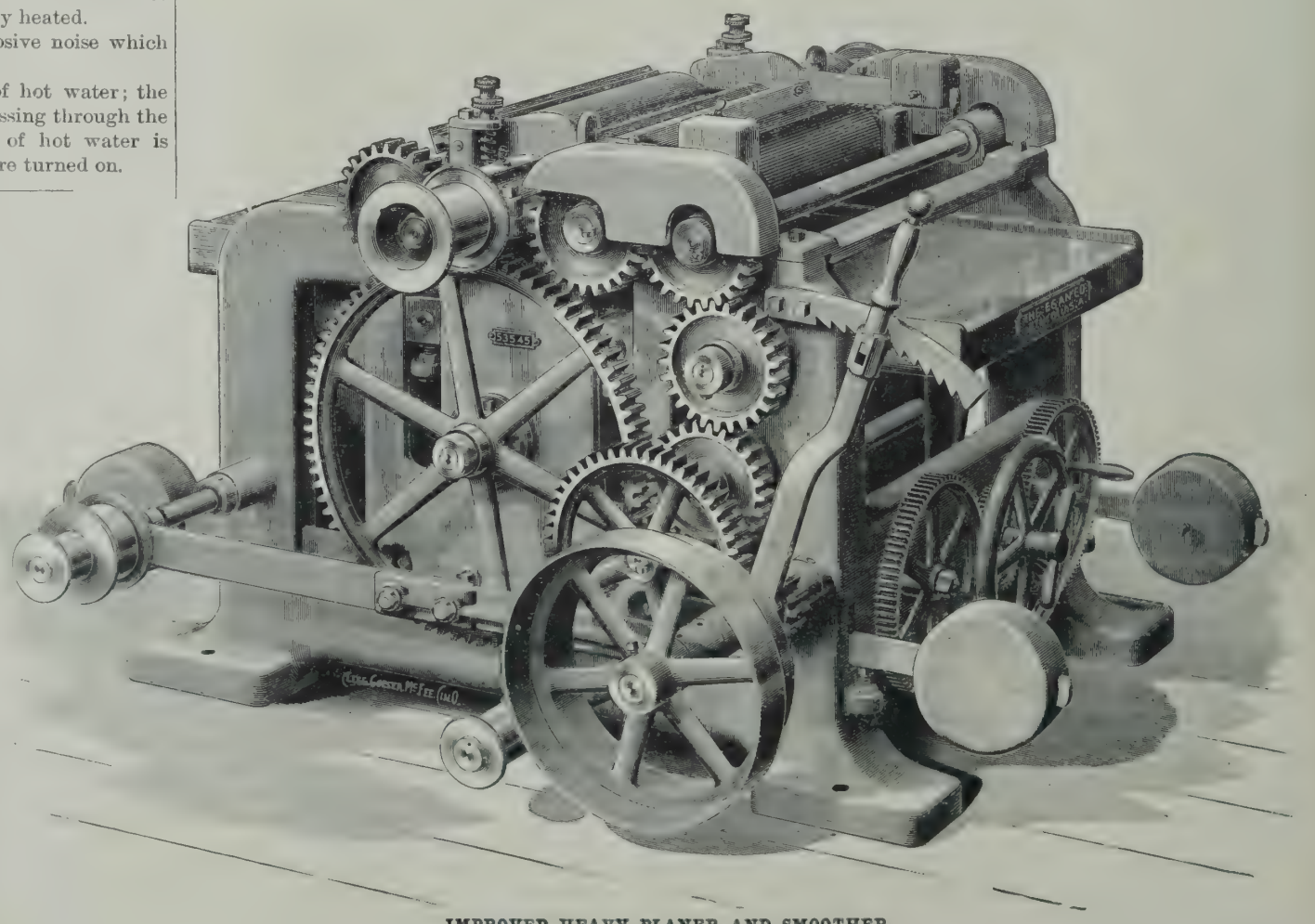
The demand for the best machine in the way of a hardwood planer and smoother that can be produced, has resulted in the machine shown by the engraving. The machine is so constructed as to combine strength and solidity, two very great factors tending to make a perfect smoothing planer. The firm makes machines of this style to work 24, 26, 28, 30, 36 and 42 inches wide.

Knotty, cross-grained, gnarled, and short lumber, also framed stock (where the planing must be done with and across the grain), require a machine differing materially from the ordinary planer, and every feature found necessary to do this work is embodied in this surfacer. One of the great advantages of this machine, especially the wide sizes, is that the material may be fed diagonally under the cylinder, which is far better than running a cylinder in a diagonal position, as it permits of the running of straight bolts to the cylinder and also the planing of short pieces.

The bed is dovetailed into the frame, and is raised and lowered on inclines of extra length by means of two screws operated by the single hand-wheel at the front. The inclines support the bed in an absolutely solid manner, free from any vibration.

The pressure bars are of commendable arrangement and construction, and are brought so closely together that the shortest material can be planed in the most perfect manner.

The feed consists of four powerfully driven rolls, large in diameter, placed very close to the cylinder. The upper front fluted roll is geared at both ends, giving it parallel lift, and making it impossible to raise out of gear. There are two speeds of feed. Feeds of 20 and 35 feet per minute are furnished, but faster feeds can be provided if desired. The feed, driven from the cylinder, increases or diminishes in proportion to the speed of the cylinder, and is stopped or started instantly by means of a binder, and controlled by a lever convenient at the operating end of the machine.



IMPROVED HEAVY PLANER AND SMOOTHER.

Something about Oilstones.

No article in a mechanic's kit of tools is of greater importance than the oilstone; for no matter how good may be the quality of edge tools, they are of no service unless properly sharpened.

If it were possible to show in figures the total loss in damaged tools and wasted time resulting every year from the use of poor and unsuitable oilstones, the result would be amazing—far exceeding, doubtless, the total amount of oilstones sold. Nevertheless very few mechanics and still fewer tool dealers understand the particular merits of the various oilstones on the market, or how to select them for different purposes.

To give a few practical suggestions on the selection, use, and care of stones, in words which can be understood by the novice as well as the skilled mechanic, is the object of an admirable little pamphlet published by the Pike Manufacturing Company, of Pike Station, N. H. The booklet costs nothing, but the information which it gives is invaluable and most attractively presented.

The pamphlet differs widely from the usual trade catalogue. It is written with a certain respect for the Queen's English which can not be too highly commended. The catalogue writer who can couch his thoughts in terms which do not jar upon the man with a keen understanding of the niceties of literary expression, is indeed a rare bird. The author of the little pamphlet in question, however, has expressed himself with a certain clearness, and at times with a certain grace for which he deserves unstinted praise.

Besides its literary merit, the booklet is distinguished by still another trait—its modest tone. Nearly every catalogue published bears the name of a manufacturing firm on its cover, printed in huge letters that glare at one with a persistency almost insulting. It was only after a most thorough search that we discovered the name of the makers of the oilstones referred to in the booklet. Not on the cover we found it, nor even on the title-page, but carefully hidden away in a footnote, and printed in modest, inoffensive type.

How to Violate an Insurance Policy.

PROPERTY-OWNERS often violate the terms of a fire insurance policy, says the New York Evening Post, without knowing it. Hundreds of dollars are thus paid out yearly for policies that would be worthless if a claim should be contested. An authority calls attention to the following ways in which a policy of fire insurance can be violated:

(1.) Failure to pay premium at the proper time.

(2.) Change of title or ownership by sale, gift, marriage settlement, devise—any way but by descent—without the consent of the company.

(3.) Mortgaging the property insured, real or personal, when prohibited by the conditions of the policy, without the consent of the company.

(4.) Foreclosure proceedings without the consent of the company.

(5.) False statements in applications (when applications are taken) relating to title, encumbrance, and other facts material to the risk.

(6.) Other insurance without the consent of the company.

(7.) Permitting buildings insured to become vacant or unoccupied for more than ten days without the consent of the company.

(8.) By taking in a new partner without the consent of the company.

(9.) Increase of risk by keeping prohibited articles on the premises or by change of occupancy of the premises insured.

(10.) By the removal of personal property to a new location without the consent of the company.

(11.) The erection of an exposure to the property insured without the consent of the company.

THE Phœnix furniture and hardwood polish has been in use for three years, and has given universal satisfaction. This polish will surely give lustre and tone to the finest grade of hardwood furniture. It is easily applied; little labor is required to produce the desired high polish.

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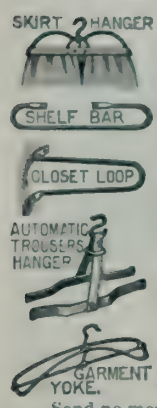
Goodform Closet Sets



Most clothes—ladies' gowns and men's suits—spend more time in closets than on their owners. Why not use the closet time to restore garments to their original shapes? Goodform Closet Sets will do this. They freshen the appearance of clothes while their owners sleep. They double the capacity of a closet. A set will save its cost in one season. The illustrations show how, but our booklet explains in detail. It is free to those who send their dealer's address as well as their own.

Goodform Closet Sets are $3.00 each, prepaid, by express; two sets in one shipment, $5.50. Sets for Ladies consist of—12 Garment Yokes, 12 Skirt Hangers, 2 Shelf Bars, 2 Loops. Sets for Gentlemen consist of 12 Garment Yokes, 6 Nickelplated Trousers Hangers, 2 Shelf Bars, 1 Loop.

Sample Ladies' or Gentlemen's Sets—containing about one-third of above articles—$1.00, express prepaid by us. Trousers Hanger, 30c, or 4 for $1.00; 6 and 1 Loop, $1.50, by mail, postage prepaid by us.

Goodform Closet Sets are sold in the better class of Dry Goods stores and by leading Clothiers and Furnishers. If your dealer does not keep and will not order one for you, write us for address of dealer who can accommodate you.

Send no money to us if you are in reach of these selling agents:

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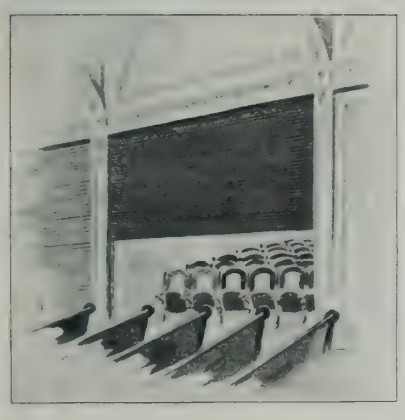

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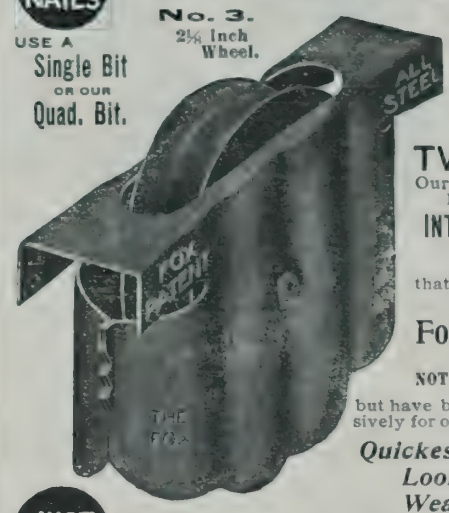

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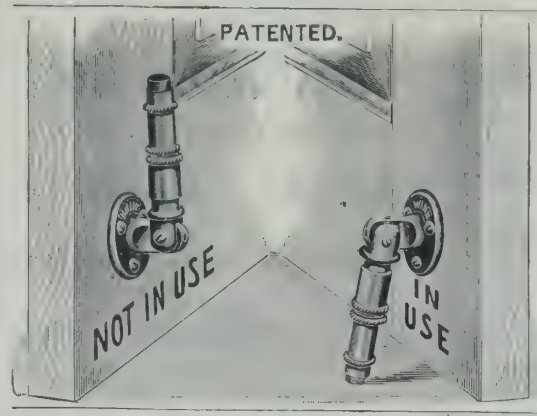

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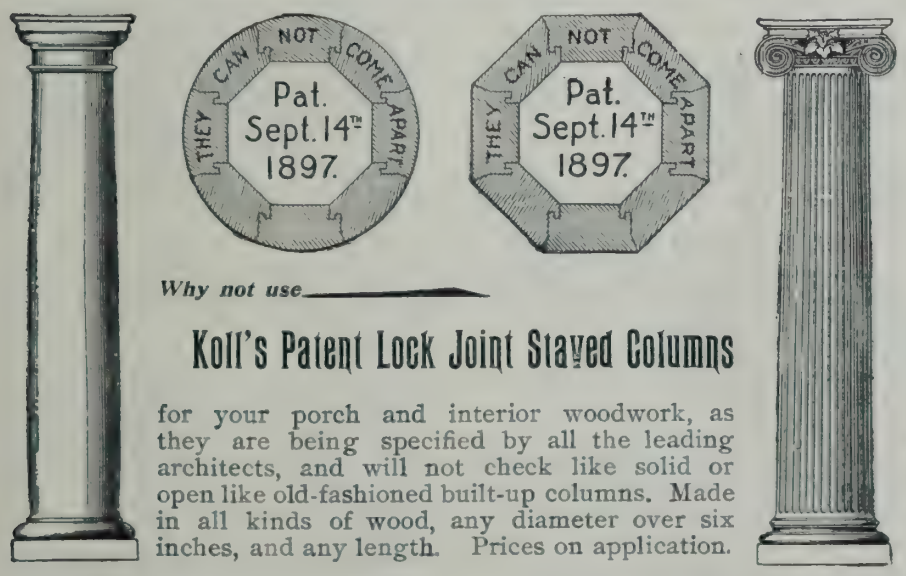

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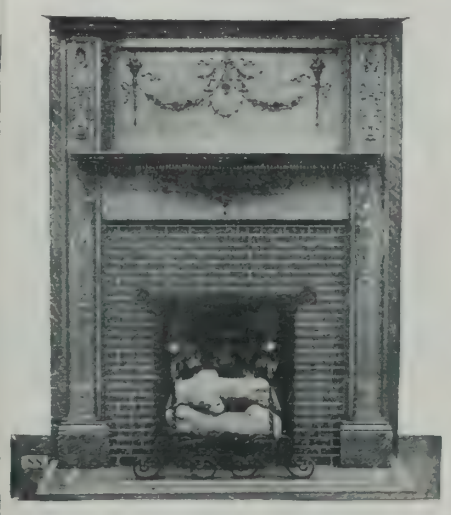

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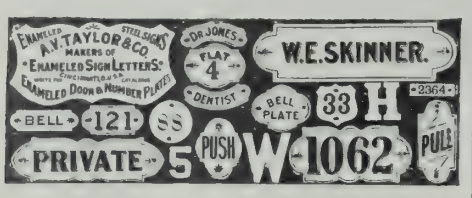

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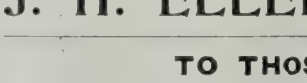

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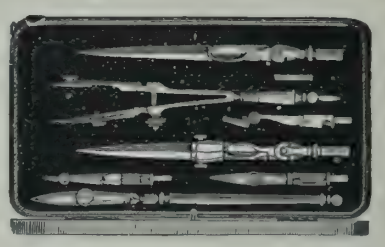

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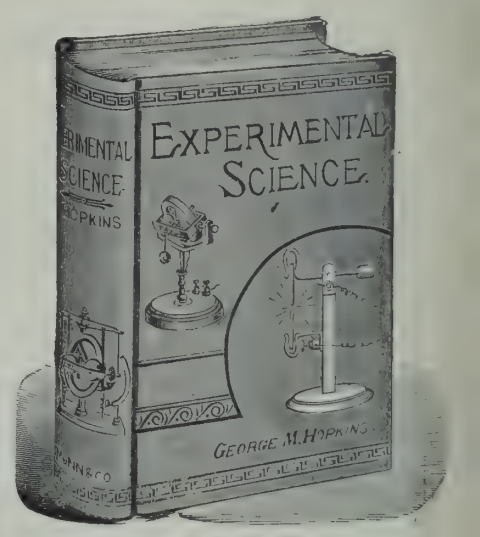

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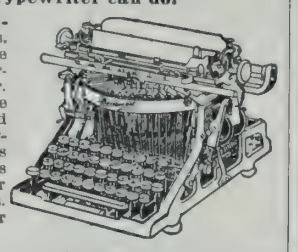

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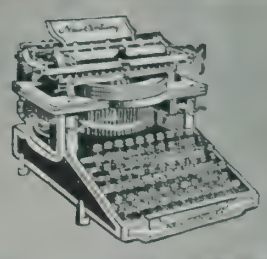

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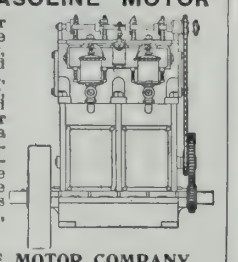

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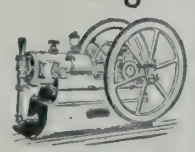

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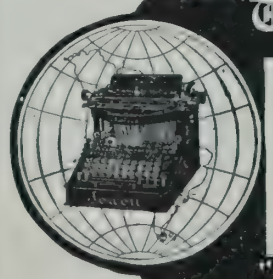

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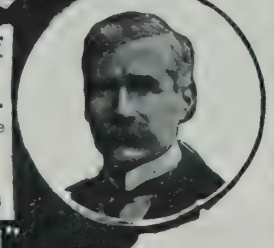

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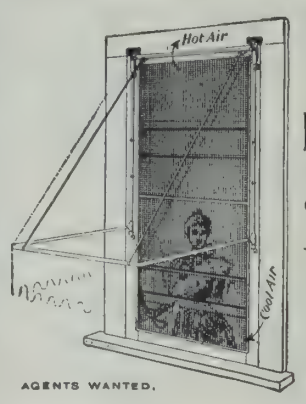

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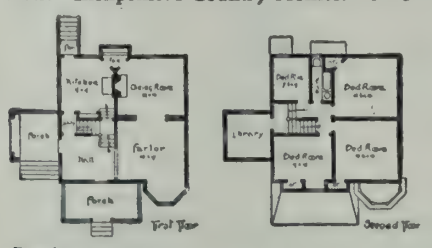

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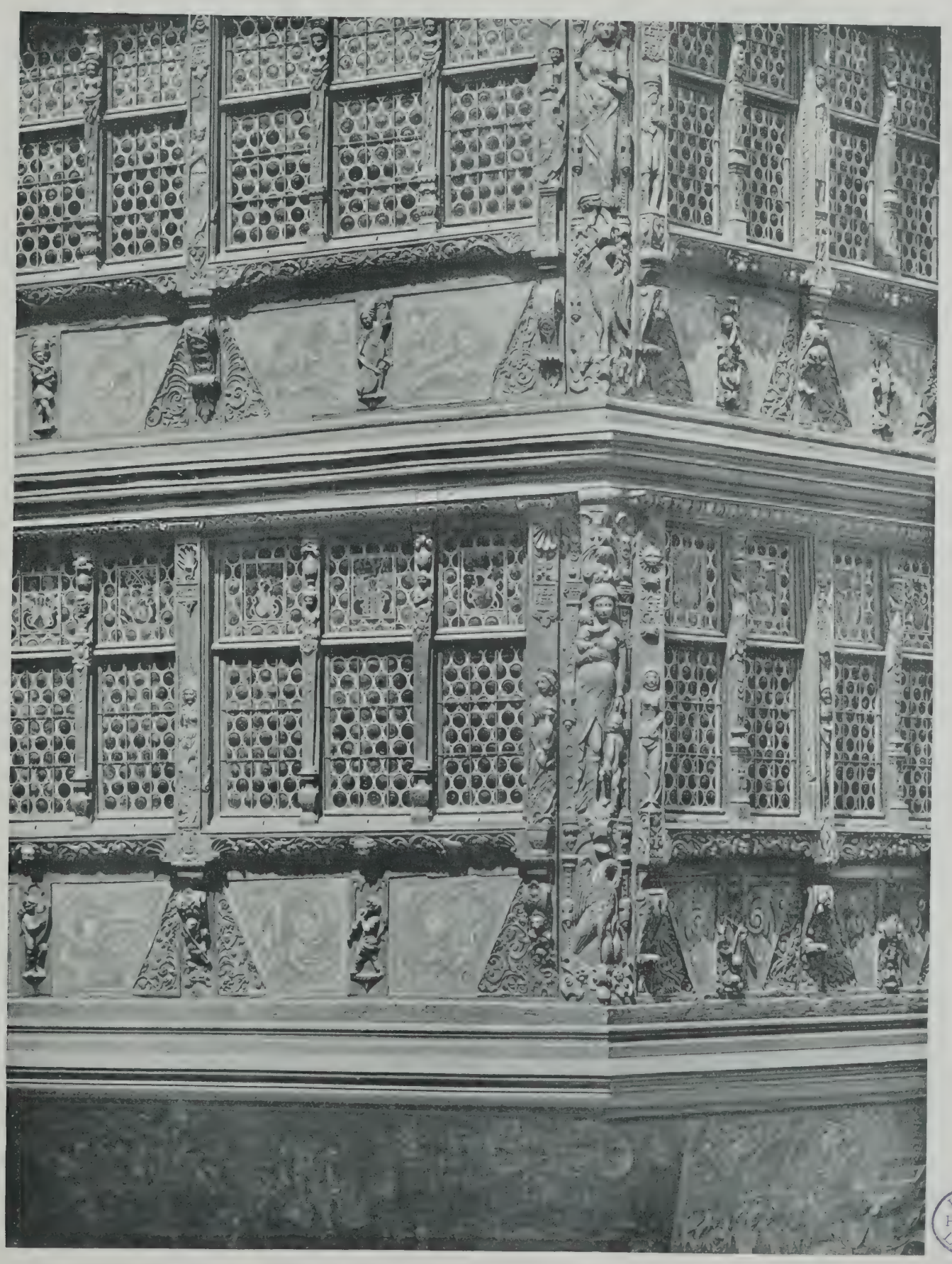

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THE KAMMERZELL HOUSE IN STRASSBURG, GERMANY.—See page 116.

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ARCHITECTURE AND CITIZENSHIP.

PROF. A. D. F. HAMLIN, DEPARTMENT OF ARCHITECTURE, COLUMBIA UNIVERSITY, NEW YORK.

CITIZENSHIP implies and imposes duties; whoever would enjoy its privileges must discharge its responsibilities. These duties, whether political or social, rest upon an ethical basis and are defined and determined by ethical considerations. What, then, can they have to do with architecture and the fine arts? I hope to show that in the domain of architecture there is a large field for the exercise of good citizenship. In so far as art has to do with life, it has to do with morals also. It cannot separate human life, human passions, aspirations and activities from the operation of ethical laws. A picture may be, in the artistic sense, wholly beautiful and yet utterly damnable from the point of view of the moralist. Its æsthetic qualities depend upon composition, color, light, and shade, perspective and values, texture and drawing, which have nothing to do with morals. That an ignoble picture may be a magnificent work of art is no more impossible than that a vile nature may inhabit a superbly framed body.

Since art exists for man, and is under the dominion of moral laws, we have in human nature the meeting ground for both sets of emotions and activities. The theoretic distinction between the fields of art and morals, so clear and sharp when we are engaged in abstract criticism, often vanishes when we consider a work of art in its relation to humanity. Art has been defined as "the expression of emotion in form," and works of art have no excuse for being except as they appeal to our emotional nature. But just at what point our emotions emerge from the domain of morals into that of æsthetics, in how far and when the one set of morals are called into activity apart from the other, it would, I think, be very hard for us to say. Their scientific separation is a task for the metaphysician, an academic rather than practical question in most cases.

The moral relations and aspects of the arts must then be sought in the minds and thoughts of men, rather than in the products of the arts themselves. In this study we have to consider first the artist, then the spectator. What is the sentiment which the artist has sought to embody, the inspiring idea of his creation? From what conditions and environments did it spring? A work of art is the product not merely of its author's fancy, but of the age and civilization of which he is himself in part the result. Religion, which in all ages has called into exercise the highest and noblest of human emotions and aspirations, social conditions, education, the prevalent standards of taste—all have had their part in the production of a work of art. We may then inquire as to the effect upon the mind of the beholder of the work under consideration, and the probable influence upon the public mind and taste of the multiplication of works of the same kind. And there is finally the broader question of the proper function and place of the fine arts in the public life and thought. The practice of the arts involves expenditure—of time and energy by the artist, of money by the purchaser. Any increase of the national artistic activity, unaccompanied by a proportionate increase in the dynamic resources of the nation, means a proportionate diversion of energy from other interests to the arts, which may be a good or an evil thing. Great art epochs have always been periods of great prosperity and abounding energy, often following great military or political successes; while a nation absorbed in the conquest of nature, in war, or in commerce, has no surplusage of energy and interest to devote to the fine arts. Extravagance in the pursuit of the arts is a common prelude to national decay. Greek art culminated after the triumphant defeat of Persia, but the extravagant Alexandrian age marked the beginning of the Hellenic decline. The first half of this dying century was so filled with industrial and political revolutions that the arts languished; they flourish to-day under the reign of general peace and prosperity. The pressure of the tremendous work of colonizing the West, and the bitter political struggle over slavery, which culminated in a civil war, checked completely the growth of our nascent American art; but it was revived in our time, because the country is peaceful, prosperous and rich. It is proper to inquire at any time whether the arts are being practiced under right conditions, are tending in right directions, and are engaging the resources of the community in just or in excessive degree. It is right, therefore, that the citizen should interest himself in these questions, and should see to it that he stands rightly related to the arts alike in his position as a citizen, as a spectator or critic, and as a creator or promoter of works of art.

It is only a little corner of this broad field of inquiry that I propose to survey—a small part, indeed, of that portion which belongs to architecture. This is the most important part of the field, it is true, for architecture, more than any other of the arts, concerns the community at large, touching its life at more points and more intimately than painting, sculpture, or music. For, while pictures and sculpture are sources of occasional gratification and more or less momentary interest, we live and move in the constant presence of architectural works. In the city especially, architecture surrounds and frames our lives, meets us at every turn and bounds our horizon. The house we live in is a work of good or bad architecture. The church in which we worship is a monument of good, bad or indifferent taste. It is our taxes which have helped to erect yonder superb pile or to perpetrate this or that monstrosity of a depraved civic taste. Your pennies for the morning or evening paper are helping pay the interest on from two to fourteen superposed stories of stone, marble, iron and brick on Herald Square or Newspaper Row, and the marble palaces of the Clearing House and of a score of banks were built in part out of your bank deposits and mine. Neither you nor I can escape a measure of responsibility for the architecture of our city, any more than for the character of our city government, whatever the excuses we may allege. It is perfectly true we had no voice in the specific design of any of the buildings about us, just as it is true that our votes may have been cast against unworthy officers; but as our civic duty in politics does not end with the casting of ballots, but includes the exertion of every influence within our power for the maintenance of right principles and ideals in the whole community, so in the matter of the architecture of our cities our duty lies not only in insisting upon high standards in such building enterprises as we control, but also, and quite as truly, in aiding in the development of a pure and correct public taste which shall make bad public architecture impossible. To encourage the growth of good taste in architecture is the duty of every good citizen; to exemplify good taste by just criticism, wise praise, and merited condemnation, the duty of every critic; to insist upon it, the duty of every promoter, director, or owner of any building enterprise; to exhibit by good designing and workmanship, the duty of every architect and artisan.

No one is likely, however, to trouble himself greatly in this matter until profoundly convinced of its importance. I ask your attention, therefore, to a few considerations on the function of good architecture and its place in our life.

Whatever may be our philosophy of æsthetics, no intelligent person can deny that the externals of our material environment exert a considerable influence upon us. Beautiful buildings delight us; mean, vulgar edifices offend us. We enjoy a concert, a play—yes, even the act of worship—better in a noble and beautiful hall than in a barn-like or over-gaudy building. We prefer to live in an attractive block rather than in one of mean appearance. We enjoy walking by way of well-built, handsome streets, and avoid those which are commonplace or mean. I believe few of us cross Madison Square or go to a shop on Twenty-third Street without a delighted glance at the noble white arch and columns that adjoin the Square; and what a dreary blank it would seem to us now if those embellishments were suddenly to vanish from that site! Many of us have visited Paris, and most of you can doubtless recall a thrill of exhilaration and delight at the stately vistas opening out from the Place de la Concorde, the perspective of the Avenue de l'Opéra, the beauty of the gardens of the Louvre, and the grandeur of the façade of Notre Dame, or of its noble interior. Others, again, will never forget their first glimpse of the fairy splendors of the White City by Lake Michigan, or the sudden gasp of amazement when they first stood under the dome of Santa Sofia at Constantinople.

The universal happiness of countenance of the crowds that visited the Chicago Fair was even more remarkable than their amazement at its wonders. Pure pleasure, healthy enjoyment, cheerfulness, smiles and delight are good things to enter into one's life. They are good for the health both of the body and of the soul. Is it nothing to your life that you live in a decent and attractive quarter, and not on Pell Street? Did you never turn aside into St. Patrick's Cathedral or Trinity Church, or the Temple Emanu-El, or the Columbia Library, or Grant's Tomb, or any other noble interior, to feast your eyes on a little architectural splendor, and then come out with an exhilaration like that received from grand music or good company? If not, try the experiment and see.

It is a notable fact within my own experience that the students in architecture in Columbia University have done better work than ever before—more of it, more cheerfully, and with a better moral tone to their life and conduct since the School of Architecture moved from its former cramped quarters into its present ample and almost sumptuous rooms, amid architectural surroundings of the highest interest. No one would be so foolish as to claim that good architectural surroundings will change a man's character in any radical way, or lead a woman from vice to virtue. But an abundance of good architecture will affect the moral tone and health of a community for the better, because an environment of agreeable objects, and the constant experience of cheerful and wholesome impressions, are undoubtedly efficacious in helping to maintain good and happy spirits and general contentment. If one is tired or discouraged he is likely to find little to cheer or divert him in a stroll through Macdougal or Hester street; but Central Park, the Metropolitan Museum, and upper Fifth Avenue may, at least for the time, call away his thoughts from himself and give him a moment's pleasure.

It is a very curious thing that our civic governments and our city communities in general have fully realized this truth in one of its aspects, but wholly failed to apprehend it in another. There is no more popular subject for expenditure than our public parks, and no one begrudges the millions that have been lavished upon them in New York. But consider a moment the grounds of this expenditure: they are partly sanitary, but more largely moral and æsthetic. The parks are "breathing places," but they are more than that—they are smiling places, playing places, laughing places, places to be happy in. What makes people happy in them—space and sky? You may get those in the vacant lots. It is the beauty and charm of the landscape and the prospect of nature controlled by art. We employ in our parks landscape gardeners and architects for the express purpose of beautifying them, and in this embellishment architecture is coming to play an increasing part. All this is perfectly correct; but why should the city confine its gifts of beauty and art for the public enjoyment to the parks? Why should it not use its vast resources also to beautify the crowded parts of the city, amid the very homes of the art-starved poor, by erecting, or at least encouraging the erection, of works of decorative architecture wherever possible? The city and community have wholly failed to apprehend the fact that all architectural embellishment of the city is as legitimate and proper and rational a return to the taxpayers of their contributions as the creation and maintenance of the public parks and the providing of music in the summer months. Is it not a strange thing that in this rich metropolis there is not a single work of decorative architecture erected at the public expense outside of the parks? But there are other ways in which the city can and should confer upon its citizens the blessings of good architecture—in the design, namely, of all municipal edifices. The disgraceful phenomenon of Horgan & Slattery, architects to the city—not by virtue of a well-established professional reputation, but by grace of Tammany—should be an impossibility. The recent efforts of Tammany to call down and humiliate and snub such architects as Mr Withers in the new Tombs prison and Mr. Thomas in the new Hall of Records should call down a storm of denunciation that should prevent a recurrence of such performances forever. It is encouraging to see the daily press beginning to take an intelligent interest in these matters. In such matters our citizenship should count. And it should count in encouraging the Naval Arch enterprise, and, if possible, in keeping it for the site of the present arch, right astride the chief artery of the city's life. It should count in favor of the employment of the highest artistic talents in great enterprises and in the public schools—a branch of architecture in which great improvement has been made in the past few years, thanks to the intelligent efforts of Mr. C. J. B. Snyder, architect to the Board of Education. It should interest itself in our public bridges to assure for them an artistic design. The success of the Washington Bridge, justly the city's pride, should have made impossible the monstrosity of ugly engineering which is to span the Manhattanville valley and connect the Riverside Park with the new Riverside Park to the north.

These considerations are as valid for our Federal and State architecture as for municipal buildings; but I deem the latter the most important field of activity, because the most directly under our control. By voice and pen, by personal influence and by votes, we should do what

we can, both to create a right public sentiment in favor of good architecture and to influence the conduct of public building enterprises along right lines. The architectural improvement of our water-front, the building of beautiful bridges, the erection of artistic, fire-proof, well-lighted and ventilated school-houses, the laying out and embellishment of small parks, the multiplication of fountains, arches and exedras in our streets and squares; the adornment by grass-plots, flowers, and ornamental adjuncts of such dreary areas as Longacre Square and the "Circle" at 110th Street and Central Park West; the decoration of court rooms and other places of public assembly. These are things which it is in our power, little by little, to accomplish. There is not a third-rate capital in Europe that is not far ahead of New York in these things. The Architectural League, the Sculptural Society and the Municipal Art Society are thoroughly awake on this line, and they afford example of what can be done and a nucleus for future activities in which all citizens can participate.

unquestioned. The State exercises no control whatever over the artistic character of the design. This is, on the whole, wise, for art flourishes best under free competition, and official restriction is a dangerous enterprise. But while the owner is thus legally free to do as he pleases in the way of design, is he morally free so to do? I trow not. He owes a debt to the public—no less real because he is never called to account for it. He owes to the public unearned increment of value and advantage derived from the public light and air, and particularly from abutment upon the public thoroughfares and consequent accessibility. He pays taxes, it is true, for paving and sewerage, and a tax upon the value of his land; but this by no means discharges his debt to the public, for it is a debt which he cannot pay in coin of the commonwealth. He can discharge it only by giving to the public in return the gratuitous enjoyment of beautiful, restful, refined or splendid architecture; and this it is his duty and his privilege to provide. To affront the public with a brutal, or vulgar, or hideous design is to insult his benefactors.

competent talent is always available, and that there are plenty of people who are perfectly ready to employ the incompetent. The moral of this is simple: it is that those who build should not undertake their enterprise in lightness and indifference. If they are not sure of their own taste, or of the real competence of the architect they propose to employ, let them get advice and counsel from experts whose opinions stand high in the profession; let them take any or all measures suggested by reason and common sense to save themselves from the stigma of an artistic crime

But we are not all land owners—more's the pity!—nor trustees and directors of building enterprises. Most of us have no voice whatever in the design of any building. Our influence on architecture can be only indirect; but indirect influences are often in the end the most powerful. The mission of the layman, of the citizen who neither builds nor directs or owns buildings, lies in the field of the public taste. He and she—the woman quite as much as the man—help to form that mysterious, im-

INTERIOR VIEW OF A SUMMER RESIDENCE AT SOUND BEACH, CONN.—See page 116.

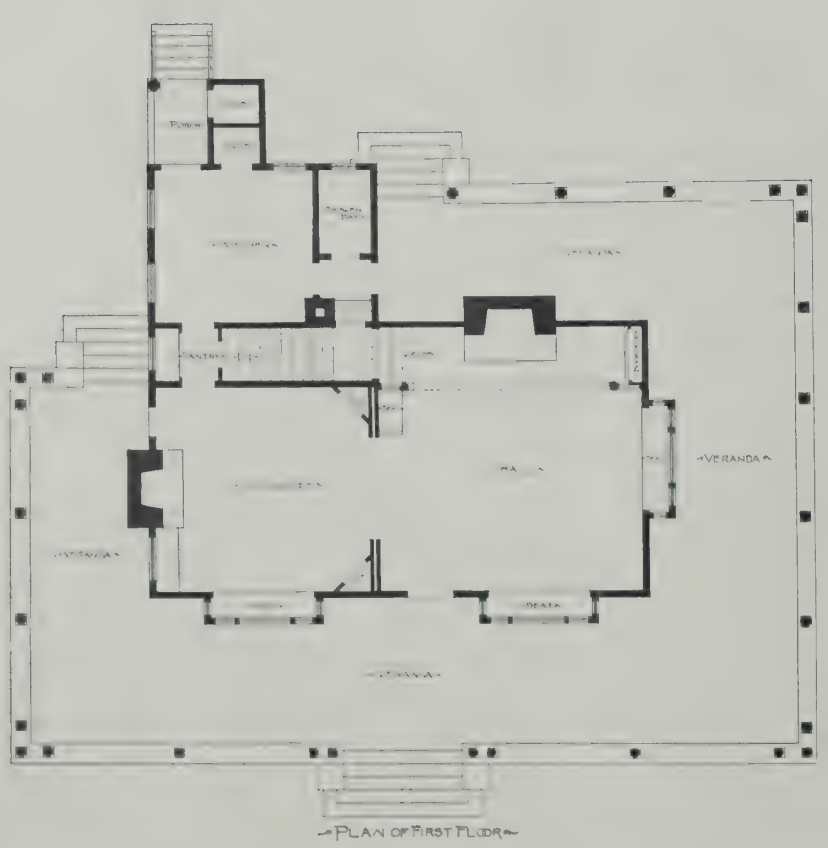
I come now to another part of my subject, in which our duty is not quite so clear—that relating to private architecture, both commercial and domestic. Modern individualism is a great thing, to which we owe most of our liberties and much of our progress. But it has wrought some results not altogether commendable. It has obscured the debt of the individual to the community by emphasizing the absoluteness of his control over what is his. Under our modern conditions not only does the owner rarely or never consult any one's wishes but his own as to the design of his building, but he is apt to resent the interest of his neighbor in the matter, and his criticism of it, as an intrusion into what is no business of his. If he chose to erect the veriest eyesore of a house or shop no one can prevent it except by buying him out. The restless and jagged skyline of many of our streets, with twenty-foot slices of façades, each swearing violently at its neighbor by crude contrasts of line and color, is a monument of individualism raised to the *n*th power.

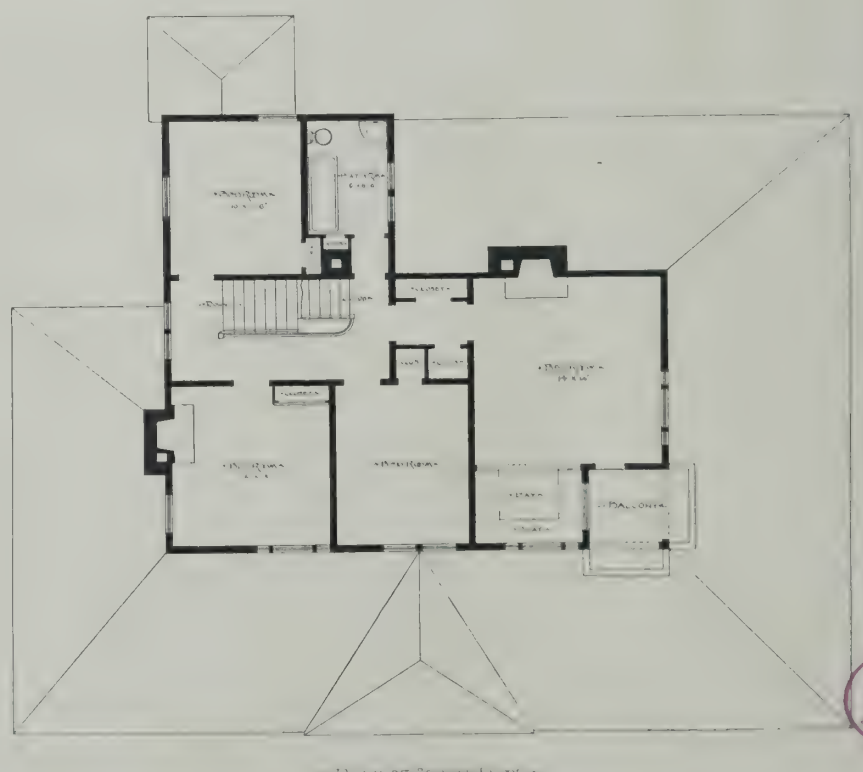
The absolute right of an owner of real estate to erect upon his land any kind of building which does not contravene the expressed legislation of the State and city is

It is more than discourtesy: it is a crime. I hold it to be his duty to build as beautiful a building as he knows how or can procure to be built for him for the means he can command. It is a duty which he should regard seriously, not lightly. Few, I imagine, intentionally erect ugly buildings, but many—oh, what a host of them!—perpetrate monstrosities from pure ignorance or indifference. The duty of beautifying their twenty-two or fifty or one hundred feet of street line has never been suggested to them. One who realizes this duty discovers that he has assumed a serious responsibility. A doctor observed to a lawyer who twitted the medical profession on getting their mistakes buried six feet below ground, that "lawyers' mistakes were sometimes hanged six feet above ground." But a builder's artistic mistakes stand fifty or a hundred feet above ground, and they are not cut down after a few hours, either! They stand for years, an affront to all passers-by. It is of no use to blame the architect—the owner is responsible for him! A good architect costs no more than a poor one, and a poor one is never worth his fee. There are good architects almost idle; there are bad architects up to their eyes in work—not many of either condition, but enough to prove that

personal, gigantic force of public opinion. Public opinion is shaped mainly by two processes: Agitation and reiteration. Set the public to thinking about a hitherto neglected question, and keep it thinking upon it long enough and seriously enough, and the thousands of vague and various opinions of its units will gradually gather about one or two propositions or conclusions, and crystallize into definite shape; and when the public reaches a conviction, beware of standing in its way! Abuses live by confusing the public mind to prevent this crystallization of convictions. Reforms are effected by agitating the confused mass and by constantly reiterating the maxims of the higher truth. When the people at large become interested in the public aspects of architecture—and the people are you and I and others—the quality of our public and private architecture will rise. There has been gain already in this line. When speculative builders realize, as they seem to be doing, that ugly and inconvenient houses will not sell, they will employ good architects to design their houses, as some are doing. Make it uncomfortable for people who put up hideous buildings, and they will cease doing so. Agitation and

(*Continued on page 116.*)





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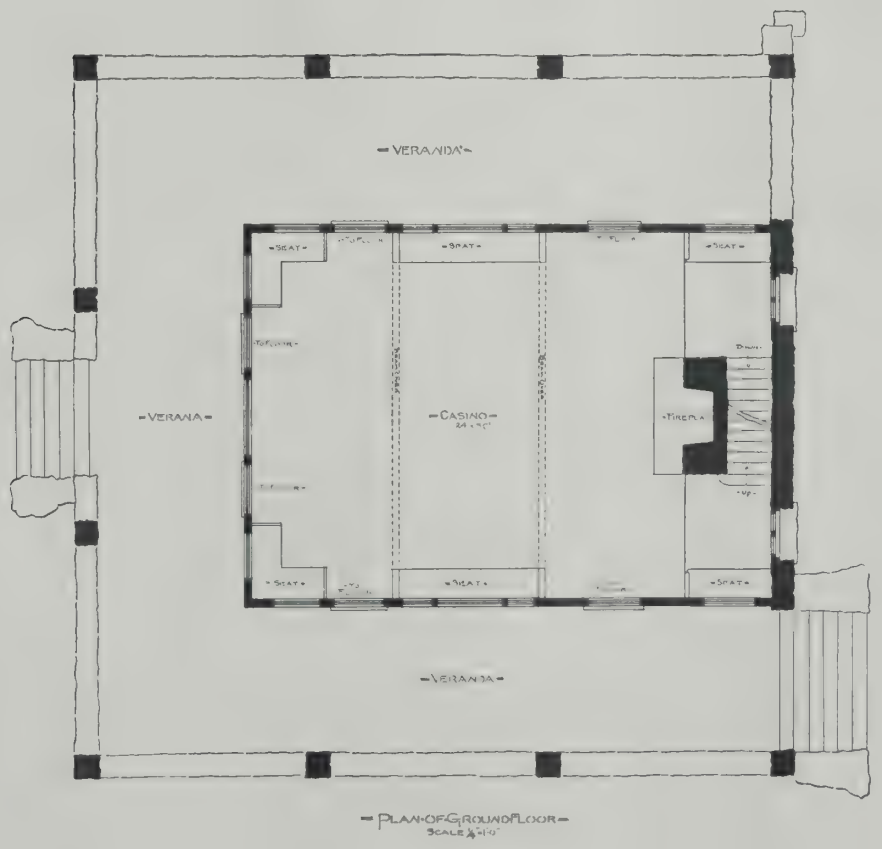

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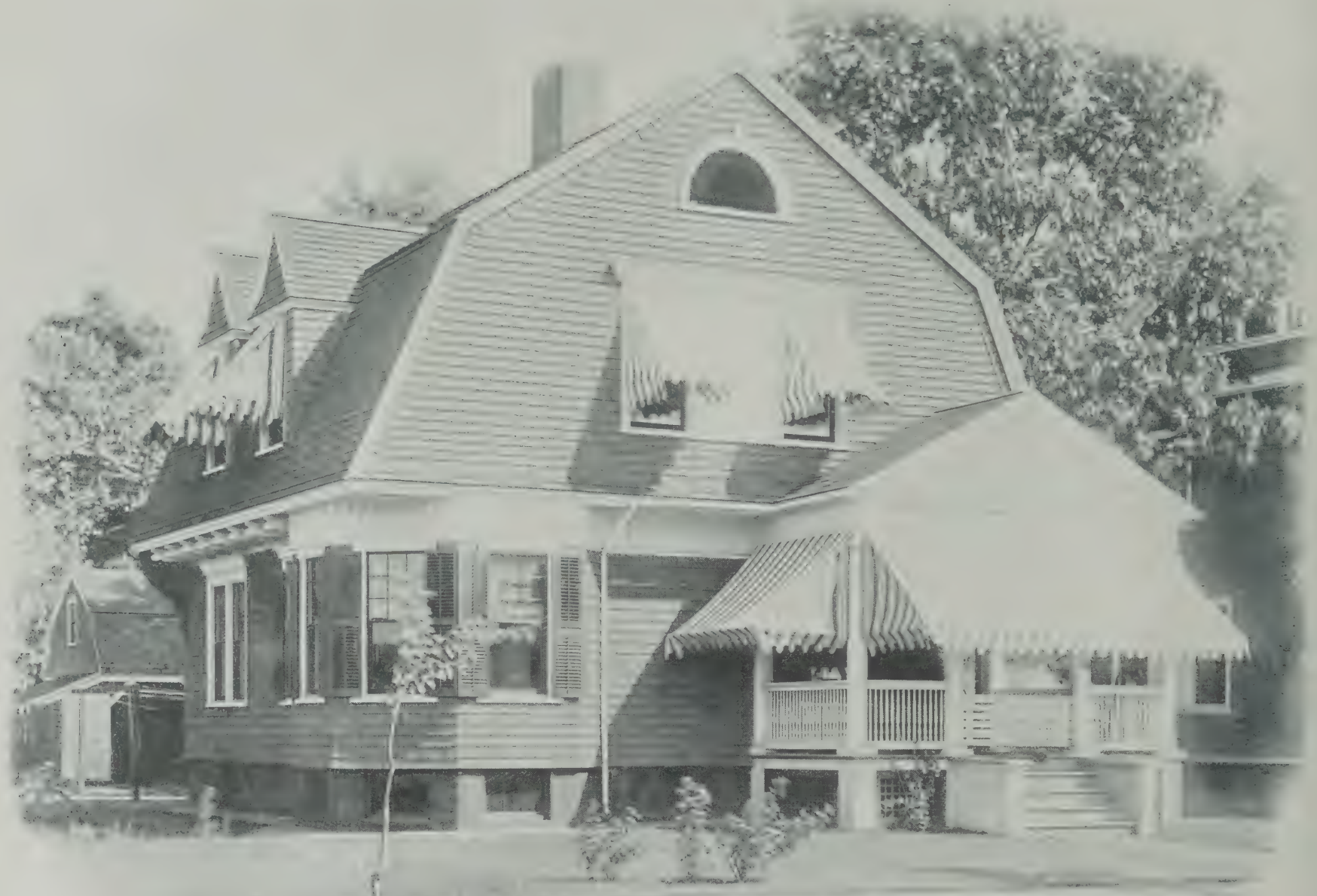

A MODERN COLONIAL HOUSE AT SPRINGFIELD, MASS.—See page 116.

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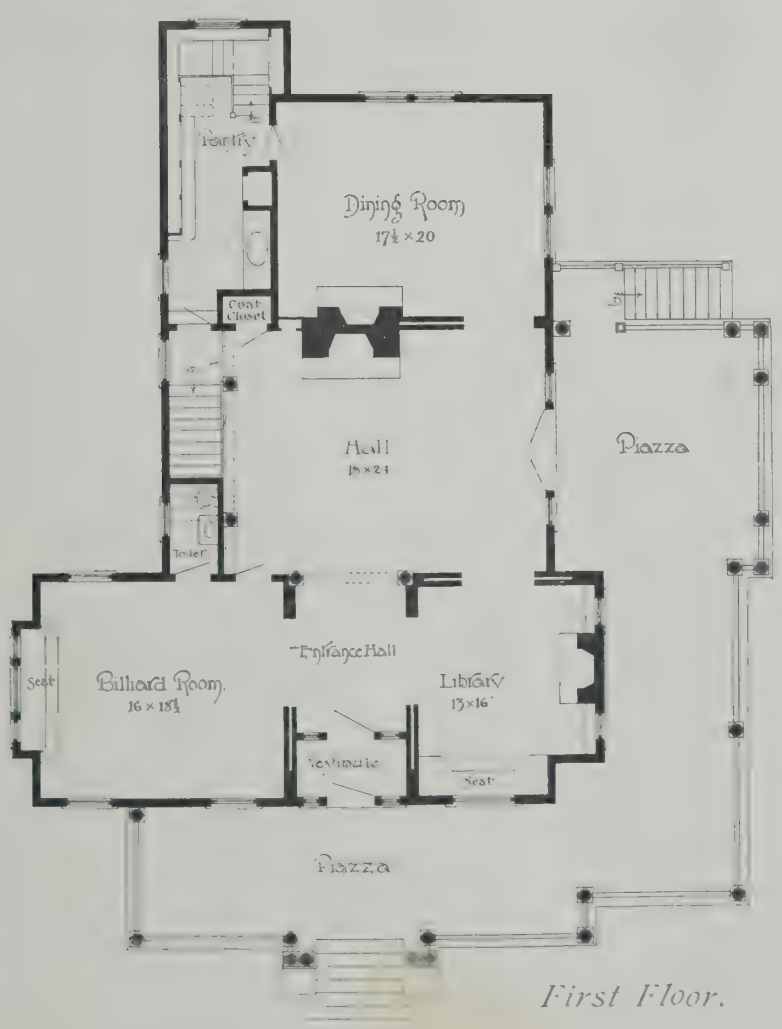

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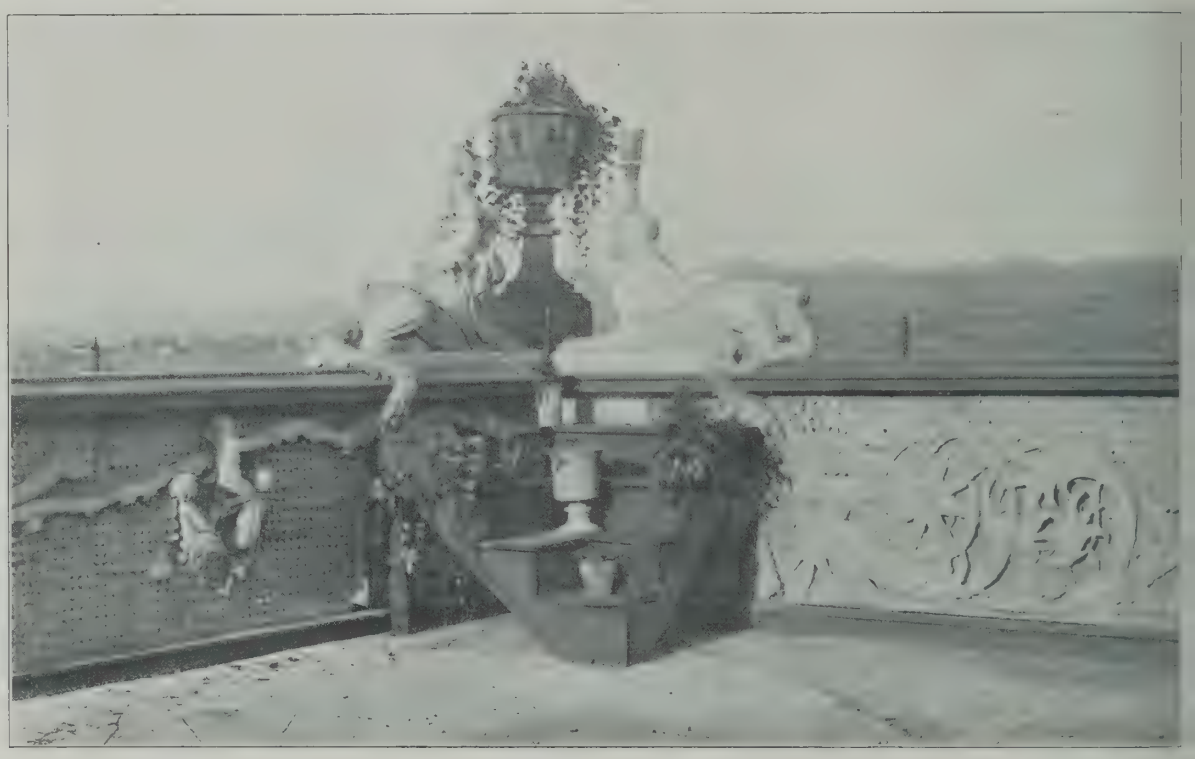

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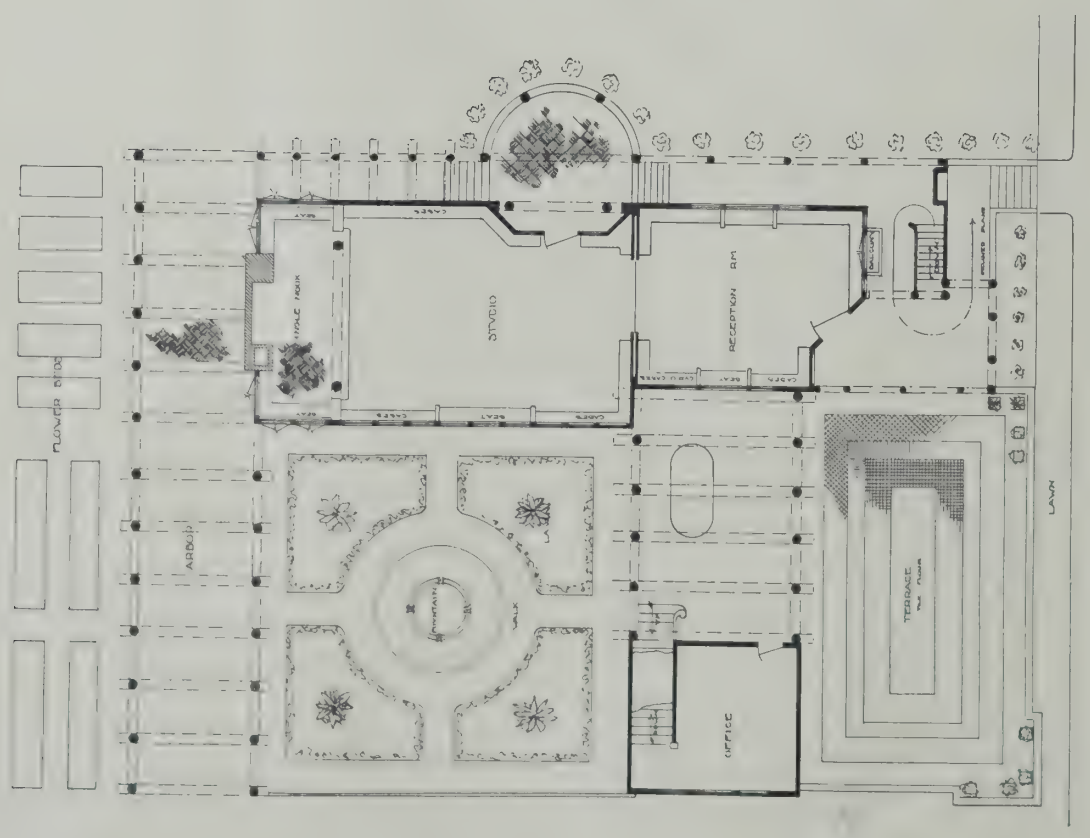

AN ARTIST'S HOME IN OAKLAND, CAL.—See page 117.

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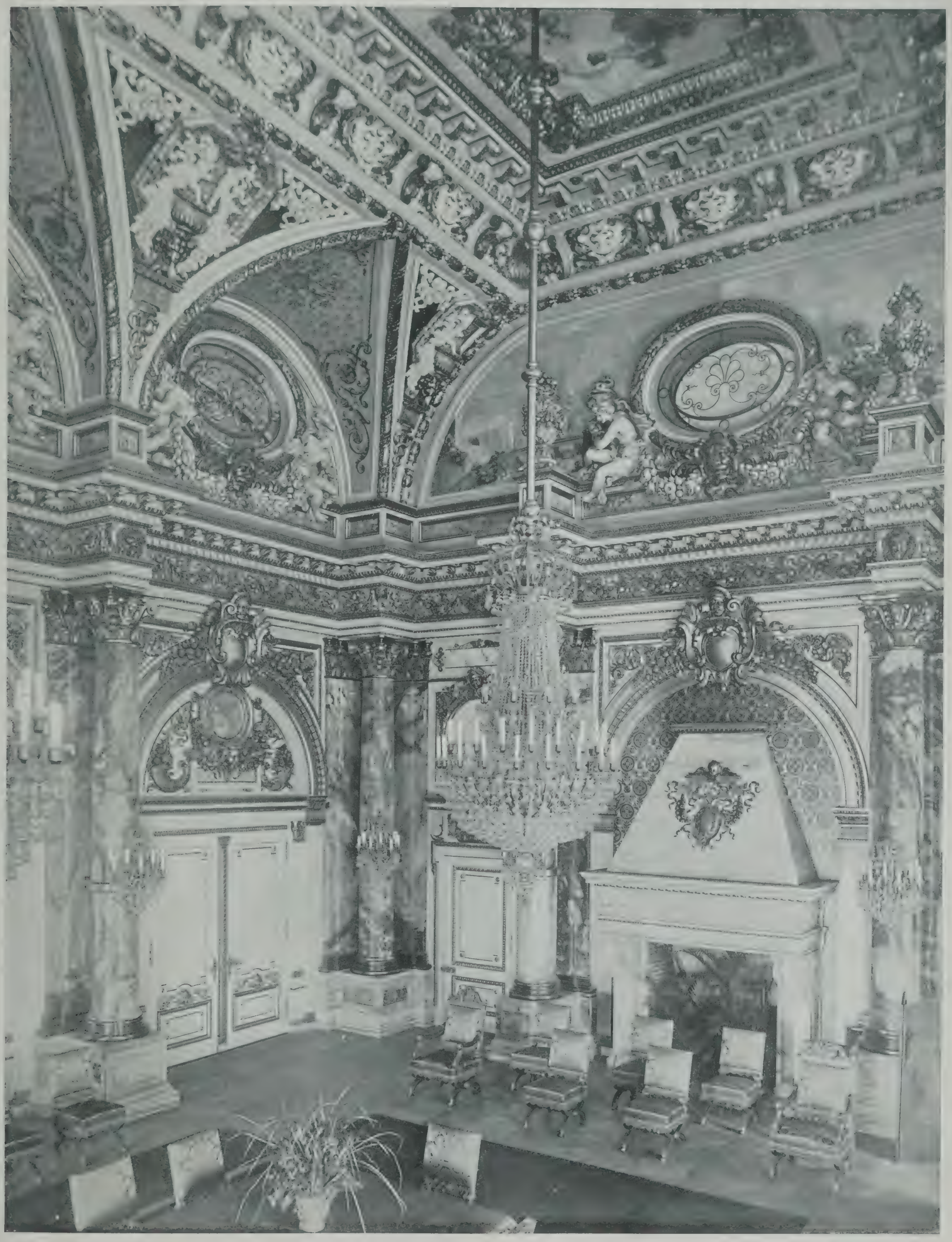

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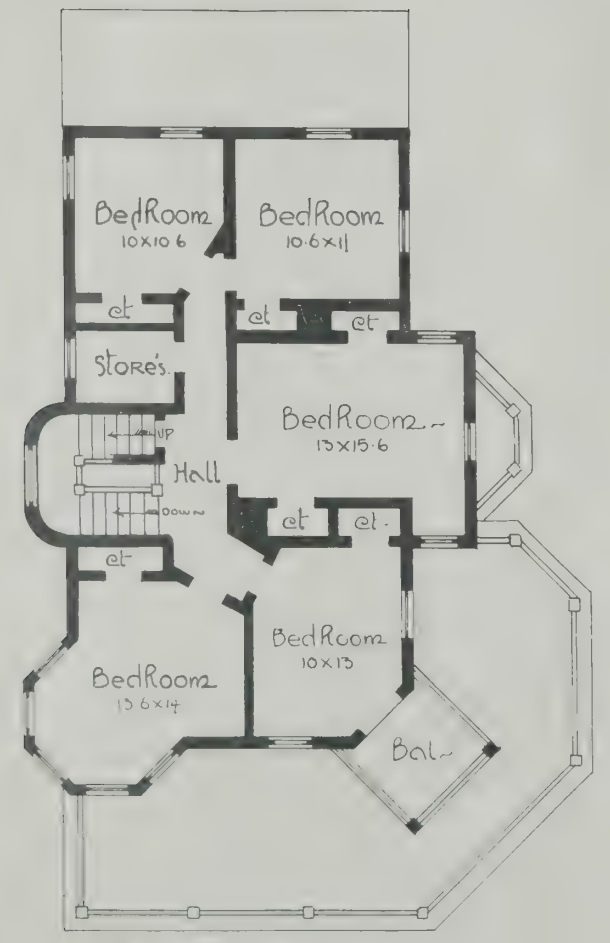
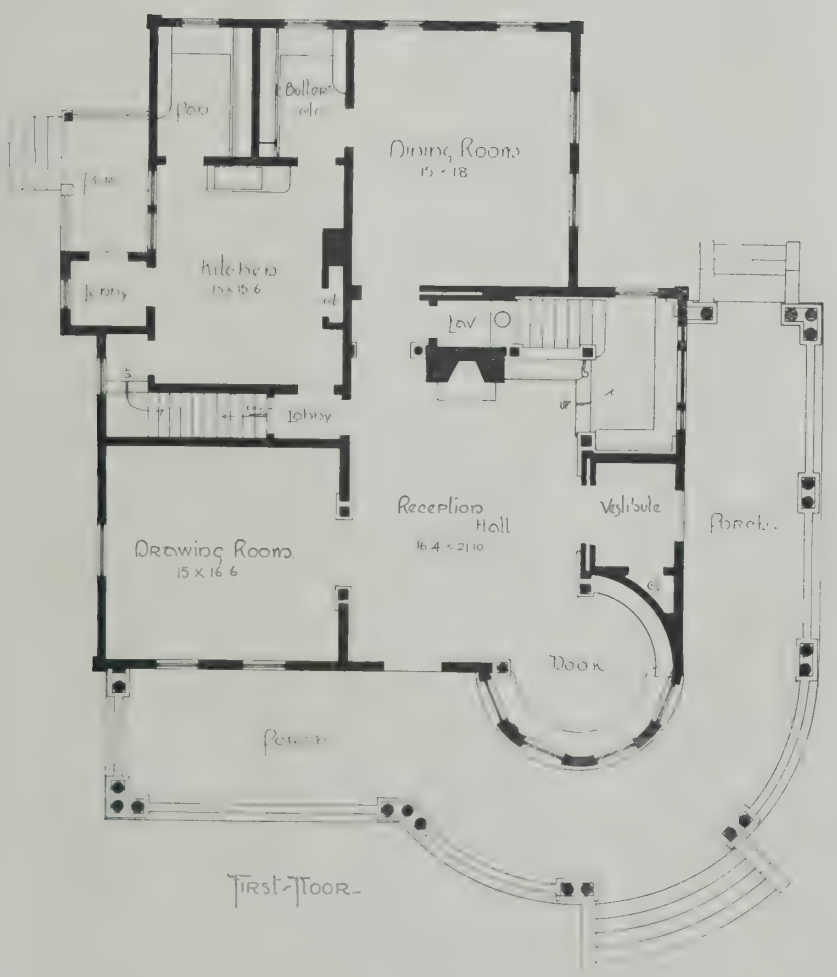


Second Floor.

A SUMMER RESIDENCE AT WOODMONT-ON-THE-SOUND, CONN.—See page 117.

MESSRS. THEO. NEWTON & CO., ARCHITECTS.



A COLONIAL RESIDENCE AT SPRINGFIELD, MASS.—See page 117.

MESSRS. LOUIS FRANK NEWMAN AND CARROLL H. PRATT, ARCHITECTS.

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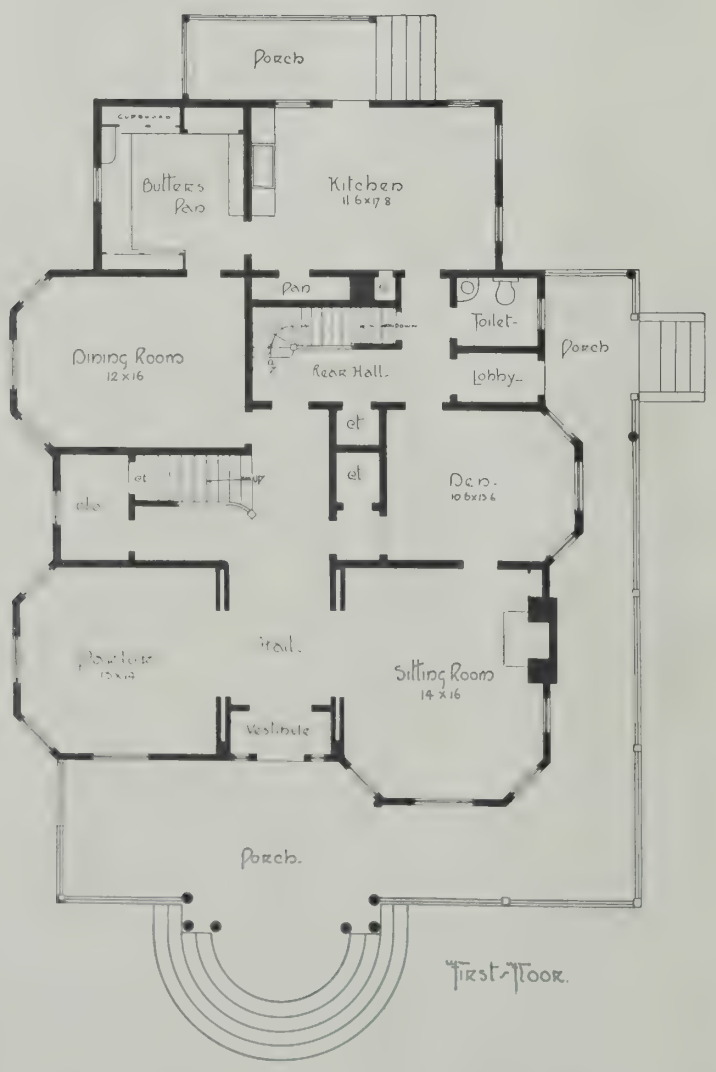
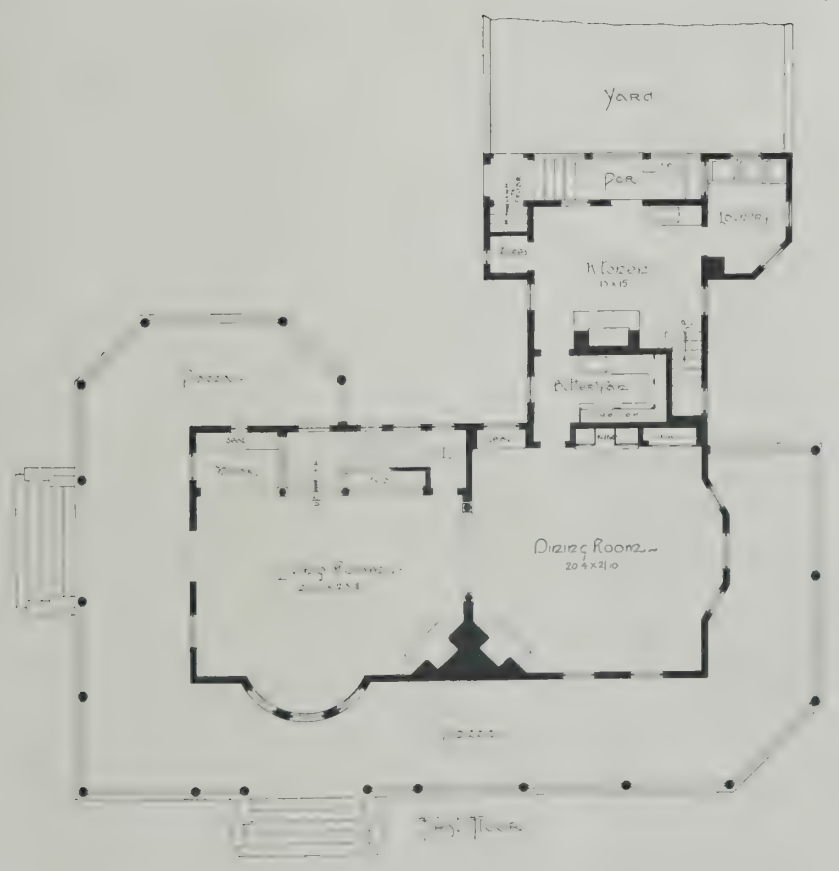


A RESIDENCE AT HOLYOKE, MASS.—See page 117.

MR. GEO. P. B. ALDERMAN, ARCHITECT.



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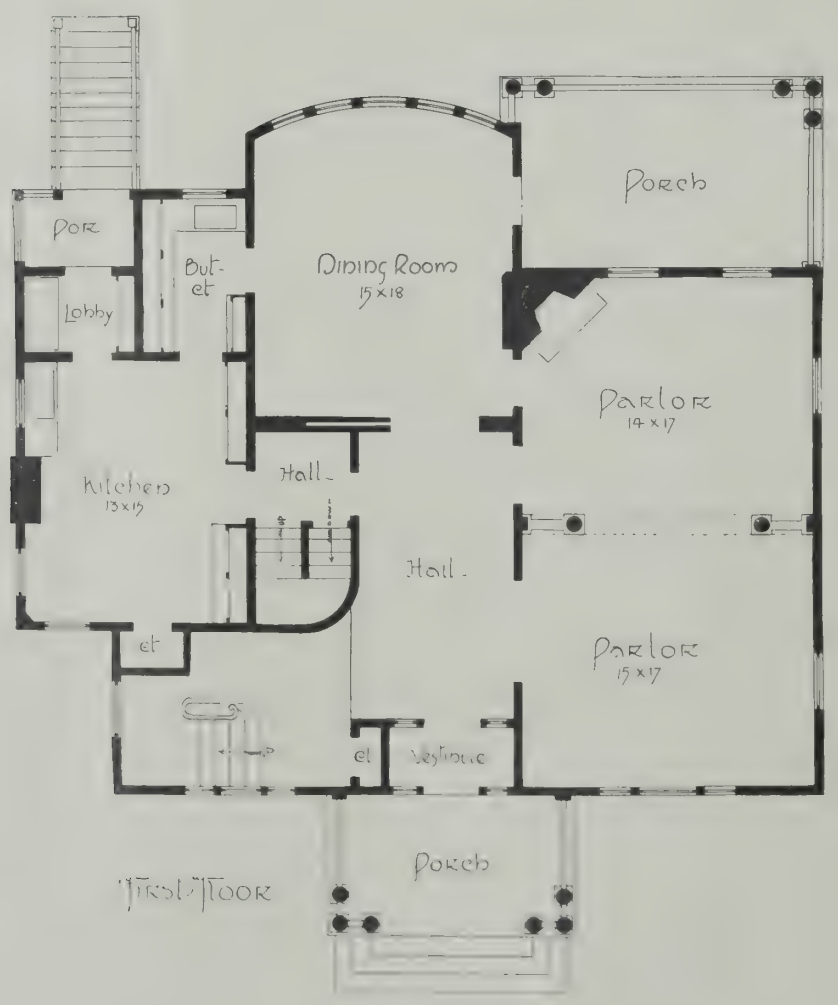
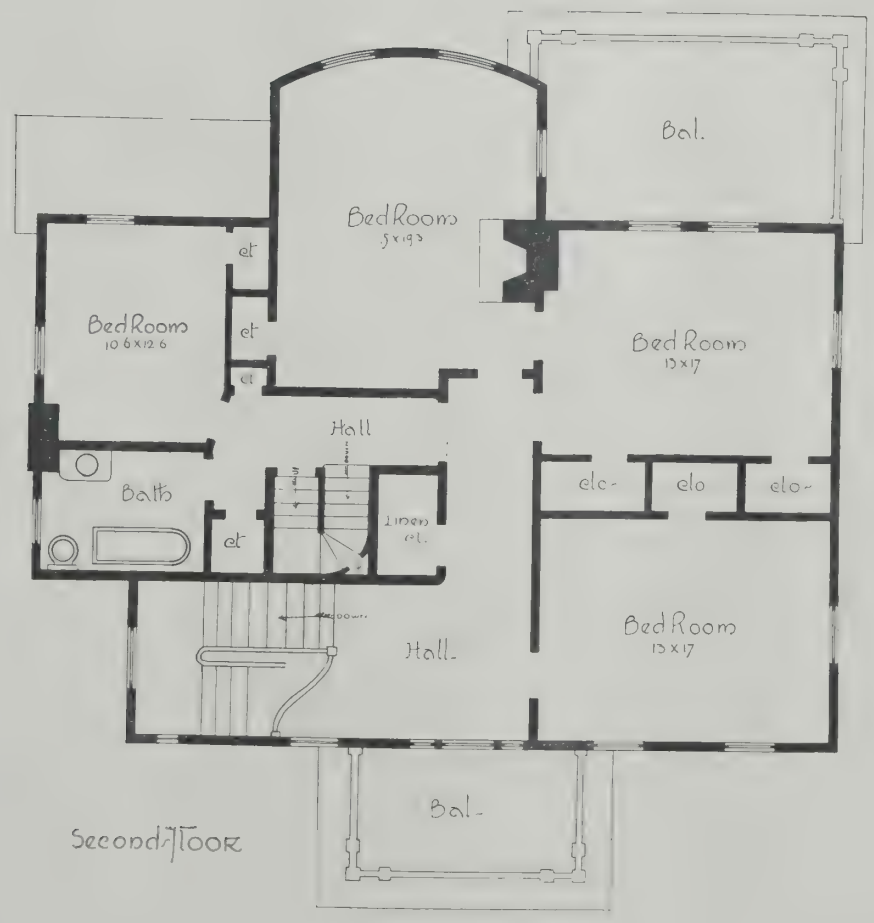
A SUMMER HOUSE AT SEA GATE, LONG ISLAND.—See page 117.

MESSRS. PARFITT BROTHERS, ARCHITECTS.



A COLONIAL RESIDENCE AT NEW HAVEN, CONN.—See page 117.

MR. L. W. ROBINSON, ARCHITECT.



A COLONIAL RESIDENCE AT NEW HAVEN, CONN.—See page 117.

MR. L. W. ROBINSON, ARCHITECT.

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ARCHITECTURE AND CITIZENSHIP.

(*Continued from page 103.*)

reiteration—these are in the power of every citizen. Organize, too, if necessary ; aye, if possible ! Do in the city what the village improvement societies do in the country. The task is huge, but the beginnings may be very small. The grain of mustard seed may grow into a tree. There are agencies already at work—the Architectural League, the Institute of Architects, the Sculpture Society, and half a dozen other regiments—already in the field and longing for your active support and co-operation. The private citizen can minister to the growth of a healthy public taste through these, and through leagues and classes and clubs, and through the influence of conversation and private life.

But for all this influence there must be a foundation of knowledge and of culture. Neither the ignoramus in art nor the learned man or woman wholly devoid of aesthetic training can pronounce an opinion or exert an influence in matters architectural that will be of any value whatever. The tyro is very apt to have opinions, and is far more apt to be filled with the conceit of his own competence in those opinions than the person who has studied the subject. The capacity for good taste may be congenital, but the good taste itself is a matter of training, of education, and culture, not of inspiration or instinct. This does not mean that it is a matter of dictation, of prescription by authority, for education does not mean something put in from the outside, but something drawn out from the existing resources of the mind. To cultivate good taste does not mean to receive from books or men directions as to what we should admire. It does mean to obtain first of all that foundation of knowledge which shall enable one to discriminate intelligently, and then to develop one's aesthetic sensibilities by contact and communion with the masterpieces of art. To this end European travel is of great value, for Europe possesses the greatest treasures of art and the highest achievements of art, especially in architecture, and to travel among these masterpieces with the distinct purpose of becoming acquainted with them, and to study them and to study about them, constitutes at least in its measure an art education of the highest value. But all cannot travel, and no one can bring the great buildings of Europe back to create a new atmosphere in which the awakened art instinct may thrive more freely. Yet we are not without substitutes for such impossibilities. The arts of photography and engraving make practicable an atmosphere of art within our own libraries and drawing rooms ; while text-books and histories without number supply the historical and technical foundation for an intelligent and discriminating appreciation of architectural works. There is no line of professional study I know of so liberalizing and widely valuable as that of the architect ; and there is no line of professional study of which so large a portion is practicable, valuable and fascinating for the unprofessional student. The wider diffusion of a good taste in architecture must depend upon a wider diffusion of elementary architectural knowledge. This means more reading on architecture—not merely of Ruskin, whose verdicts and critical estimates, and especially his critical reasoning, are often fantastic and dangerous, and not seldom absurd ; nor of Fergusson, who is often inaccurate ; nor of the dry Rosengarten, but of all sorts of books, both in English and French, with a few in German, on the general subject, and on special periods and buildings. A preliminary study of the general development of styles, or of such instructive manuals as Statham's "Architecture for General Readers," should precede the more detailed survey of special periods or of the architecture of particular countries. Upon such a foundation, which need not be technical, the student may build his later studies with as much or as little detail as may be desirable ; but it is extremely important to make abundant use of photographs and illustrations, and of the magnificent Willard collection of models and casts in the Metropolitan Museum, in order to become acquainted with the buildings themselves, not merely with the facts about them. Such study makes architecture a real thing—a part of the life and activity of humanity, a page of the history of a race as significant as the record of battles and dynasties, and full of the charm and interest, of the delight and beauty, that belong to the great products of the imagination. The study of architecture not only cultivates the taste and quickens the artistic perceptions ; it brings us in contact with the aspirations, the customs, the hopes and the achievements of past ages. It is a liberal culture almost by itself, for no art so penetrates into the life and habits of man, and is so bound up with his religion and his daily activities, as architecture. In studying the great monuments of this art we seem to come almost into physical contact with the past. We discover that the historic styles, the changing fashions of the vestments with which the builder clothes his structural creation, have been more than mere fashions, the joint result of complex agencies and forces, social, moral, political, religious and racial, and that in each period and place the prevailing style has been on the whole a true exponent of the culture, of the civilization, of the ideals of the time and people. So is it with us now. We have, and always shall have, just the architecture which we, as a people, deserve and want. If our architecture is base, or trivial, or mean, it is because we, as a people, do not really care for anything better, but are satisfied with what is mean and trivial. The lessons and achievements of the past should be our guide and inspiration for the future.—Public Improvements.

THE KAMMERZELL HOUSE IN STRASSBURG.

Among the old private dwelling-houses of Strassburg, to which the city owes much of its mediæval aspect, the most beautiful and remarkable is the so-called "Kammerzell'sche Haus," situated on one corner of the Münsterplatz. The term "Kammerzell'sche Haus" is, strictly speaking, improperly applied to the old dwelling, for it did not pass into the possession of the Würzburg family of Kammerzell until 1806; nor was a rebuilding, which would have affected its present appearance, undertaken by them. It would have been more correct to call the structure "Das Braun'sche Haus"; for the merchant, Martin Braun, in 1589, tore down the old upper stories, and upon the stone lowermost story erected the present three-storied wooden structure with its exquisite carvings. An inscription. "M. B. 1589," would also seem to indicate that Braun's name should be applied to the house. According to an inscription in the door-lintel, the lowermost story, with its four large arched windows, three in one side wall and the fourth in the wall facing the cathedral square, was built in 1467. In 1879, the city of Strassburg purchased the house and took the necessary steps to restore those portions which had been unable to resist the ravages of time. The late architect Schmitz, in 1891, was entrusted with the rebuilding of the house. Fortunately it was possible to preserve the three, upper, richly-carved, frame stories, as well as the frescoes, still faintly visible, on the walls. The lowermost story has been entirely repainted and decorated after new designs. The truly artistically-executed carvings, which constitute one of the most attractive features of the house, consist of figurative decorations, arabesques, and foliage on the window-frames, posts, and consoles, and represent the most widely different subjects. The main corner post is ornamented with three female figures, one in each story, which represent the divine virtues. The post is supported by a console with a pelican satiating the hunger of its young with its blood. Facing the cathedral square are the twelve signs of the zodiac; toward the side are fifteen small figures, five in each story, each playing a different instrument. The wooden ceilings of the several stories have been for the most part preserved. See illustration on page 101.

The house now serves as an old German-Alsacian wine-room.—*Blätter für Architektur und Kunsthandwerk.* Verlag von Julius Becker, Berlin, SW.

A SUMMER RESIDENCE AT SOUND BEACH, CONN.

We present on pages 103–104, in this issue, a summer residence, which has recently been completed for Edwin J. Lucas, Esq., at Sound Beach, Conn. The engravings illustrate a design thoroughly adapted for summer uses as well as an all-year-around house, and it has a spacious piazza nearly surrounding the house, and with a well-shaded roof over same. The underpinning and balustrade and piazza are built of shore stone laid up at random. These stones are very effective with the lichens and shells clinging to the rocks and harmonizing nicely with the old browns, blues, grays, etc., of the varied stones. The superstructure, of wood, is sheathed on the exterior framework with matched stuff, the latter covered with paper and then shingles, left to weather finish a natural silvery gray color. The roof is shingled and treated similarly. The blinds and trimmings are painted bottle green. Dimensions: Front, 40 ft.; side, 41 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior arrangement is most excellent. The entrance is into a large living-room, provided with paneled seats in bay windows and elsewhere, and a large open fireplace, built of rough stone laid up at random and rising to ceiling; the fireplace shelf is of one huge stone. The hearth is laid of Roman brick. The walls are wainscoted and the ceiling is beamed. The woodwork is finished in brown English oak, and the spaces above the wainscoting are covered with red burlap with harmonious effect. The stairs are a boxed stair, but are built in such a manner as to present an artistic effect, with fluted columns, etc. The dining-room is finished off in Flemish oak, and has blue burlap walls and ceiling beams, together with paneled seat in bay window, china closets with leaded glass doors, and fireplace built of stone same as living-room. The kitchen, pantries, etc., are fitted up in a most complete manner. A feature of the plan is the shower bath on first floor, from which a stair leads to landing of main stairs and on to second floor. The second floor is finished off in oak, and it contains four bedrooms with large closets and bathroom. The main bedroom has an attractive nook with paneled seat, and a balcony providing a pleasant outlook. The bathroom is tiled, and it is furnished with porcelain fixtures and exposed plumbing. The third floor contains three bedrooms and trunk-room. A cemented cellar contains furnace, laundry, and other necessary apartments. All fixtures in bathroom are of the Ronalds & Johnson make. The furnace in cellar is a Richardson & Boynton. Messrs. Cable & Lucas, architects, 1183 Broadway, New York, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

THE GREENWICH COVE CASINO AND THE INNIS ARDEN GOLF CLUB HOUSE, AT SOUND BEACH, CONN.

The engravings shown on page 105, in this issue, illustrate the Greenwich Cove Casino and the Innis Arden Golf Club House, at Sound Beach, Conn. The design shown presents a unique example for a seaside casino, built of shore stone laid up at random, while the roof, sloping gracefully down over piazza and supported on columns built of similar stone, is most attractive and picturesque. This stonework is built of stone picked up from the shore, with lichens, shells, etc., encrusted on same, and are varied in color, and in striking contrast one with the other. The roof is shingled and finished natural. Dimensions: Front, 44 ft.; side, 48 ft. 6 in., including piazza. The piazza is the attractive feature of the building, running around three sides of the building, and the one large room makes an attractive place for entertaining purposes. This room is treated in a most artistic manner. It has an open fireplace built of shore stone similar to the exterior, and on either side of which are pleasant nooks on raised platforms with paneled seats. The main room has similar paneled divans, and the treatment of walls in sea green burlap and the trim in ivory enamel is most harmonious. The ceiling is beamed with Georgia pine finished natural. The second floor contains a large billiard-room. The basement contains bath-boxes, toilets, etc. The building is complete in every respect. Messrs. Cable & Lucas, architects, No. 1183 Broadway, New York, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODERN COLONIAL HOUSE AT SPRINGFIELD, MASS.

The engravings shown on page 106, in this issue, illustrate a modern dwelling-house which has been erected for Palmer M. Taylor, Esq., at Springfield, Mass. The design is of the gambrel roof order, and is treated with Colonial detail. The elevations are pleasing and attractive, and they are combined with a most excellent interior arrangement. The underpinning is built of red brick laid up in red mortar. The superstructure above is covered with sheathing, paper, and then shingled, and stained a Vandyke brown, while the trimmings are painted white; blinds bottle green. The roof is shingled and stained a moss green. Dimensions: Front, 33 ft.; side, 37 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 7 ft. The reception hall is trimmed with quartered oak. The floor is of the same, with ornamental border. This hall contains an ornamental staircase turned out of oak, with seat on landing. The three principal rooms on first floor have carvings, band moulded, with dental corners or cap, Louis XVI. style. The parlor is trimmed with red birch finished natural. It has a floor of North Carolina pine, and an open fireplace, with buff colored glazed tiled hearth and facings, and a mantel of the Louis XVI. style, richly carved and ornamented. The dining-room is trimmed with red birch, and it has an oak floor, polished, a paneled wainscoting to a height of four feet, and a sideboard built in nook, with swell front drawers and cupboard below; the shelves above the drawers are enclosed with leaded glass doors. The butler's pantry, kitchen and its apartments are trimmed with North Carolina pine finished natural, and they are furnished with white maple floors, wainscoting, and all the best modern fixtures complete. The second floor contains four bedrooms, with large well fitted up closets and bathroom. The two front bedrooms have whitewood trim, finished in white enamel, while the two rear bedrooms are trimmed with brown ash finished natural. The bathroom is wainscoted five feet high with fancy sheathing, and it has exposed nickelplated plumbing, marble under fixtures and decorated bowls. The third floor contains one servants' bedroom, a large linen closet with Spanish cedar drawers, and a large storeroom, fitted up with closets, drawers, cupboards, and shelving. The basement, or cellar, contains a laundry, Boynton furnace, smoking-room, and office, and other necessary apartments. The house is lighted by gas and electricity. Plate glass in windows of the principal rooms. Cost, $3,300, complete. The contracts were let to E. J. Blodgett, mason; C. F. Beaman, painter, and O'Brien Bros., plumbers. Mr. W. S. Banning, builder, No. 50 Dartmouth Street, Springfield, Mass.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

HALL OF THE "BREAKERS," AT NEWPORT, R. I.

We illustrate, on page 109 herein, the fine hall of the "Breakers," the palatial villa of the late Cornelius Vanderbilt. We have already illustrated other features of this residence.

A RESIDENCE AT LARCHMONT, N. Y.

WE present on page 107 a residence of Colonial treatment, which has been erected for Harry T. Shriver, Esq., at Larchmont, N. Y. The design is very attractive, containing as it does a spacious piazza, well shaded and with Colonial columns. The underpinning is built of bluestone, with rock-faced laid up ashlar. The building above is of wood, and the exterior framework is covered with sheathing, paper, and then cypress shingles left to finish natural. The trimmings are painted white. The roof is covered with shingles and finished natural. Dimensions: Front, 44 ft.; side, 58 ft., not including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior arrangement is most excellent. It combines many features of interest, and the entrance hall, opening into the great living-room containing staircase, is unique. This hall and living-room are trimmed with white pine and treated with white enamel. The living-room has a wood cornice and large open fireplace, with tiled facings and hearth, and a mantel of old Colonial style with columns. The staircase is separated by an archway, supported upon columns with capitals of the Ionic order. This staircase is painted with enamel white, with the exception of the rail, which is of mahogany. A very attractive feature of the living-room is the east end of room, which is treated with latticed windows and door effects, running down to floor. The library is trimmed with mahogany, and it has an open fireplace trimmed with tiled facings and hearth, and mantel, and also bookcases built in and a paneled divan. The billiard-room at the left of entrance is treated with white enamel, and it has a raised platform in bay with paneled seat. The dining-room is treated in a unique manner. It has a plate rack around the room six feet from the floor, a wood cornice, and an open fireplace trimmed with tiled facings, and hearth and mantel. The butler's pantry is wainscoted and trimmed with whitewood finished natural, and it contains all the best modern fixtures complete. The second floor is treated with ivory white, and it contains four bedrooms, dressing-room, and bathroom. The bathroom is treated in white enamel, and it contains porcelain fixtures and exposed plumbing, all nickelplated. The third floor contains three bedrooms, bathroom, and trunk-room. A cemented cellar contains the kitchen department, laundry, furnace, and other necessary adjuncts. Cost, complete, $10,500, including furnace and electric lighting. The builder was Chas. T. Robinson, of New Rochelle, N. Y. Plumber, Richard Burnett, New Rochelle, N. Y. The range and furnace was furnished by J. B. Boynton. Mr. Frank A. Moore, architect, 123 East Twenty-third Street, New York.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

AN ARTIST'S HOME IN OAKLAND, CAL.

A HOME which was designed and erected by a sculptor, and in which are incorporated the ideas of one who has made the plastic arts a life study and profession, has just been completed in Oakland, Cal. It has the distinction of being one of the most characteristic structures in a city abounding in beautiful examples of home architecture. It is situated upon a bluff overlooking Lake Merritt on one side, and the waters of the estuary on the other. A wide view of the city is commanded from the roof garden, which covers the entire main building. The house is built in two portions, studio and residence, the former upon the level of the street, and the latter upon the bluff, and connected by the stairways and terraces in which Italian artists delight. The building is of cement, with brick foundations, the details being worked out of terra cotta. Most of the construction comes from the hands of the owner himself, Felix Peano, instructor of sculpture in the Lick School of Mechanical Arts, San Francisco. What adds to the interest of the structure is the fact that most of the details which abound throughout are the handiwork of the male and female students of Mr. Peano, though designed by the artist. Even the brick for the furnaces in which these terra cottas were baked were made by these juvenile workmen. The front door presents one of the most charming studies in the structure. It is formed for the most part of irregular slabs of charred redwood, rich tinted and close grained, meeting in points in the center. While the wealth of decoration is now mostly on the exterior, it is intended by the sculptor to adorn the interior as lavishly and appropriately as outside. Time will be required for this. Felix Peano is a native of Turin, and a favorite pupil of the renowned master, Tabacchi, and before his present appointment was a well-known sculptor in Paris.

Our engravings on page 108 were made from photographs taken expressly for the SCIENTIFIC AMERICAN.

A COLONIAL RESIDENCE AT SPRINGFIELD, MASS.

ON page 111 of this issue, we illustrate a residence of Colonial treatment, which has been erected for the Forest Park Heights Land Company, at Springfield, Mass. The elevations are treated in a thoroughly Colonial style, with excellent detail. It combines many attractive features, both on the interior and exterior. The underpinning is built of red brick laid up in red mortar. The brickwork of the piazza is constructed of buff brick. The superstructure is built of wood. The exterior framework is sheathed, papered, and then covered with narrow clapboards and painted Colonial yellow, with white trimmings. The roof is covered with shingles and stained a moss green. Dimensions: Front, 40 ft. 4 in.; side, 51 ft. 6 in., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior is treated in a handsome manner. There are two entrances to the reception hall, one of which is through a vestibule. This reception hall is one of the most attractive apartments. It is trimmed with quartered oak, and has a paneled wainscoting, a beamed ceiling, oak floor, and a pleasant nook with seats, and bookcases built in. All the archways and nooks are provided with paneled bases, from which rise columns to ceiling of the Colonial style, with carved caps. The staircase is a very handsome one, with massive newel posts, seats, etc. The fireplace is built of brick, with the facings and hearths of tile and mantel of excellent design. The drawing-room is trimmed with white pine treated in white enamel. The dining-room is trimmed with quartered oak; it has a brick and maple floor with border. A stained glass transom extends across both the rear windows and over the space between. The kitchen and pantries are fitted up with the best modern improvements, and are trimmed with whitewood finished natural. The floors are of hard pine. The lobby is large enough to admit an ice-box. The second floor contains four bedrooms, eight closets, and bathrooms. This floor is trimmed with whitewood and provided with hard pine floors. The bathroom is wainscoted, and is furnished with porcelain fixtures and exposed plumbing. The third floor contains three bedrooms and ample storage. A cemented cellar contains laundry and furnace. Messrs. Louis Frank Newman and Carroll H. Pratt, architects, 21 Elm Street, Springfield, Mass.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A SUMMER COTTAGE AT WOODMONT-ON-THE-SOUND, CONN.

THE engravings presented on page 110, in this issue, illustrate a summer cottage which has been erected for Mrs. M. B. Bolles at Woodmont-on-the-Sound, Conn. The elevations are attractive and have many excellent features. The underpinning is composed of locust posts, upon which the building rests, and the exterior posts are covered with matched stuff and painted white. The exterior is covered with clapboards and shingles, and is also painted white, the trimmings being painted a similar color. The blinds are painted bottle green. The roof is shingled and stained a moss green. Dimensions: Front, 33 ft.; side, 45 ft., not including piazza. Height of ceilings: First story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior is throughout trimmed with yellow pine. The walls and ceilings are ceiled up with narrow beaded yellow pine, and finished in hard oil. The living-room has a large bay window with paneled seat, and an open fireplace built of brick, with hearth and facings of same, and a neat wood mantel. The staircase hall, just off from living-room, is out of sight, and yet is convenient for all necessary purposes. It contains an ornamental staircase, with a bay window thrown out at first landing, glazed with stained glass. The dining-room has a bay window and an open fireplace. Butler's pantry and kitchen are fitted up in the best possible manner. The second floor contains five bedrooms, large closets, and a storeroom, which can be used as a bathroom if desired. The third floor contains one large room and ample storage. Messrs. Theo. Newton & Co., architects, Hartford, Conn.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT HOLYOKE, MASS.

ON page 112 we present a residence recently erected for J. C. Keogh, Esq., at Holyoke, Mass. The design is excellent, and is of the gambrel roofed order with its lines well broken by many bay windows, piazzas, balconies and dormers. The underpinning is built of brick, with pointed-up joints in red mortar. The first story is covered with clapboards and painted red with white trimmings. The second story is covered with shingles and stained an Indian red. The roof is also shingled and is in keeping with the rest of the building. Dimensions: Front, 40 ft.; side, 50 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft. 6 in.; third, 8 ft. The interior plan is excellent. The first floor is trimmed with hardwood and is finished natural, while the second floor is trimmed with whitewood and treated in colors and in harmony with the wall decorations. The hall has a very elaborate staircase with newel posts and balusters of neat design. A large coat closet is provided beneath stairway. The first story contains a large central hall, with parlor and sitting-room opening into same by double sliding doors. All the rooms on first floor are octagonal in shape at one end. The sitting-room has an open fireplace, trimmed with tiled facings and hearth and mantel of excellent design. The den opens off from the sitting-room and from hall at side. This rear hallway and toilet are conveniently located. The dining-room is provided with a large butler's pantry furnished with closets, cupboards, drawers, etc., complete. The kitchen is wainscoted and furnished with the best modern conveniences complete. The second floor contains a sewing-room, six bedrooms with large closets and a bathroom fitted up with wainscoting, porcelain fixtures, and exposed plumbing. The third floor contains two bedrooms and ample storage. A cemented cellar contains a furnace, laundry and all necessary apartments. Cost, $7,500, including heating, lighting, and everything complete. Mr. Geo. P. B. Alderman, architect, 271 High Street, Holyoke, Mass.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A SUMMER HOUSE AT SEA GATE, LONG ISLAND.

WE present on page 113 an excellent summer house, which has been erected for A. W. Godwin, Esq., at Sea Gate, Long Island. The pronounced features of the exterior, worthy of note, are the spacious piazza, balcony and tower. The underpinning is constructed of wood. The soil being sandy, the building is erected on posts, with the cellar wall formed of planking nailed on to the outside of posts. This cellar contains all the necessary storage apartments. The exterior framework is sheathed and then covered with clapboards and shingles. The clapboards are painted cream gray, while the shingles are finished natural. The trimmings are painted cream white, the blinds bottle green. The roof is shingled and finished natural. Dimensions: Front, 46 ft.; side, 50 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The interior is handsomely trimmed with hardwood finished natural. The hall or living-room contains a very handsome staircase with ornamental newel posts, rising to ceiling, balusters and rail. The spaces between posts have spindle work. It also contains a divan at side of staircase, a nook with seat, and an open fireplace with Tiffany brick facings and hearth and mantel. The walls are wainscoted to a height of three feet. The dining-room is separated from living-room by a square archway supported on columns with carved capitals. This dining-room has an open fireplace similar to the one in hall, and a wainscoting. The pantry and kitchen are provided with the best possible fixtures complete. The enclosed yard is a good feature. The second floor contains three bedrooms, one servants' bedroom, two bathrooms and large closets. The bathrooms are wainscoted and furnished with porcelain fixtures and exposed plumbing. The third floor contains ample storage room. Cost, $6,065.50, complete. Messrs. Parfitt Bros., architects, 26 Court Street, Brooklyn, N. Y.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL RESIDENCE AT NEW HAVEN, CONN.

WE present on pages 114 and 115 a residence which has been erected for Prof. Thomas D. Goodell at New Haven, Conn. The main lines of the house are simple, but well-proportioned. The architecture is of the American shingle style with Colonial detail. The exterior has many pleasing features and presents as much symmetry in design as possible. The underpinning is of rock-faced red sandstone. The superstructure is constructed of wood, with the exterior framework, including roof, covered with white cedar shingles, left to weather finish a silvery gray color. Dimensions: Front, 47 ft.; side, 40 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. Upon entering from front porch, the vestibule and hall are reached, which are trimmed with quartered oak with a plaster cornice at ceiling. The staircase hall is separated from the main hall by an arch and is raised up one step. The staircase is built of quartered oak, with the rail ending in a scroll and a cluster of spindle balusters at the start, forming newel-post. This staircase is lighted effectively by leaded glass windows. The double parlors are made very attractive by a special finish with form of a pair of Grecian Ionic columns and pilasters surmounted by a rich entablature, and finished in cream white enamel, the same as the other finish in room. The fireplace is furnished with tiled facings and hearth, and a classic mantel of Colonial style. The windows opening on to the porch run down to floor. The dining-room is large and pleasant, with a row of windows at end with transoms of stained glass, and a china closet at the end with plate glass doors. This room is trimmed with quartered oak, with floor laid of same. The butler's pantry is trimmed with brown ash, and has closets, cupboards, dresser and bowl. The kitchen is trimmed and wainscoted in yellow pine and is fitted up with the best modern fixtures. The second floor contains a large open hall, four bedrooms and large closets, well fitted up, and bathroom; the latter wainscoted and furnished with

porcelain fixtures and exposed nickel-plated plumbing. This floor is trimmed with whitewood treated in colors. The floors are of hard pine. The third floor contains one bedroom and ample storage. A cemented cellar contains furnace, laundry and other necessary apartments. Mr. L. W. Robinson, architect, 323 Exchange Building, New Haven, Conn.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

Evolution of the English House.

WHEN Mr. Addy speaks of the "English House" in the book under the above title,* it must not be supposed that his purpose is to throw light upon the genesis of the modern villa. He is alluding to a period prior to building estates, even before the Italian architect of the sixteenth century had set the type in this country of what every nobleman's mansion should be. "The English House" is the house of our forefathers who lived during the Edwards, and into the Wars of the Roses, before merchants grew rich under the patronage of King Henry VII., and began to tire of too simple a mode of life. Such a house as Mr. Addy describes was in itself so elemental a matter, that we had hardly regarded its growth as deserving of so large a title as that which is given to it, especially when treated independently of general social development. The author, however, in addressing himself to structural influences and peculiarities, has afforded some very interesting information, while he assists the reader by means of photographs and plans which illustrate actual examples. These examples, if their date cannot actually be verified, are far more convincing than the form of evidence more usually supplied from ancient manuscripts, wherein legendary dwellings are depicted, which are obviously of a Byzantine and traditional character. Such documentary specimens are valuable thus far, inasmuch as they invariably present us with the basilican form, and it can hardly be doubted that it was the acceptance of such a form by the rude inhabitants of Northern Europe that marks the first advance in dwelling construction. It is not in the accommodation provided by such a plan wherein the advance consists. The plan embraces but a single room, and the proprietor of cave or hut could boast as much. But in fusing itself into the hut style of construction, the basilican idea provided height, by which the health and comfort of the occupants were better met, and even enabled a building of more than one story to become a possibility; moreover, it introduced the *bay* as a constructive element, and, in doing so, it foreshadowed, at least, the more actual subdivision of the plan. Among rude buildings of Germany and in the instance of "Coits," which, as the author explains, are a combination of dwelling-house and cattle-shed to be found in Yorkshire, a more composite basilican plan is evident. The rectangle is broken by a series of posts which form the head of the stalls and against which the partitions butt. A corresponding series on the opposite side produce an effect of nave and aisles. We are unable, however, to follow any development of this arrangement, and would rather confine ourselves to discussing the possibilities of the single chamber. This single chamber, in the most elementary type of habitation, exists alone. As time advances, it gathers smaller chambers around it. Seldom does the whole in any proper sense approximate to a plan—it is still the single chamber with accretions.

We can probably refer to nothing earlier than the circular hut dwellings upon Dartmoor. Remains of these cover the hillsides, and although for the most part they can scarcely be distinguished from the scattered rock, yet in many places, notably at Grimspound, their forms are clearly marked by the well-laid stones of their foundations. Hundreds here lie clustered together, the whole surrounded by a defensive wall. These huts measure some eight to ten feet in diameter, and have a portion of the floor paved and raised above the general level of the ground, presumably as a sleeping space. It is impossible to assign any date to these dwellings, since they supply no record in the way of implements or pottery; but the author, in describing what would appear to be a similar village at Glastonbury, is able, from remains of various sorts, to hazard their date at some 200 years B.C. At Glastonbury also may be seen the round and rectangular hut side by side, showing that the difficulties presented by the latter form in the construction of roof and angles had by then been overcome. The materials employed would depend upon the situation. Upon Dartmoor these would necessarily be stone. But where timber was obtainable, the wall were formed of piles and wattles, upon a stone foundation, or a double row of piles with clay between, after the manner of a coffer-dam. Or the walls might be dispensed with, and the roof spring from the underpinning, and this would bring us to the form of construction of which the book gives us an illustration.

Here, too, we notice the introduction of the bay. The forked principals or crutches of the roof spring from the ground and present the appearance of an inverted boat. Lack of head-room towards the sides would, however, take much from the area of the room. To correct this, it would appear that the collars of the forks were prolonged to carry a plate for the feet of the rafters, which would afford the height required, when the vertical space between ground and plate was built up. The distance between any two forks formed a bay, the bay being always 16 feet or thereabouts. Thus a house was described by the number of bays it contained. The length of a bay was, according to the author, fixed by the space required to accommodate two yoke of oxen. The oxen ploughed four abreast, and four abreast they were stalled. A perch, which was the linear standard of old time (and walling in the country is still measured in perches), was 16 feet, and land was thus measured by the span of oxen employed in ploughing it. A house might boast of several bays, but it was still a single room; or, if it were to possess another chamber, a further bay was added with a partition wall, or a lean-to, or "outshot" was placed against one of the ends. Thus a house of any importance, a manor or grange, would probably consist of the hall, with a store or stabling beneath one bay, and over the stabling a chamber or "bower" for the women-folk, and another, the "solar," for the thane or master, approached by an outside stair, the hall being used by night as the sleeping apartment for the servants. The buttery or kitchen would occupy an outshot. The hall was also known as the "house-part" or "fire-house." The latter term suggests the importance with which the means of warming the house was necessarily regarded. It cannot be doubted that the whole arrangement of the accommodation turned upon this, and the difficulties presented are, we think, responsible largely for the slow development of house planning. The fireplace and flue constructed against and in the wall could have been but little in use before the fifteenth century; and the latter, often formed of plaster and timber, brought the danger of the total destruction of the house within measurable distance.

"Anciently before the Reformation," says an old writer, "ordinary men's houses, as copyholders and the like, had no chimneys, but flues like louver holes, some of them being in when I was a boy." Another declares that in the memory of the old men who lived in his village, there were not above two chimneys "in most uplandish towns. . . . Each one made his fire against a reredosse in the hall, where he dressed his meat." Mr. Addy thinks reredos to have been "a canopy made of wood and plaster which so often stood over the open fire-hearth and received the smoke," but we have generally seen it described as the hearth itself.

The fire so laid in the center of the hall was the only safe method; yet the inconvenience occasioned by this, except in a room of very large size, must have been intolerable by reason of smoke, draught, or both. Thus it is likely that the inns were frequented by the poorer people in search of warmth, and the name of "cold-harbor," which is often met with, may refer to such use. It was only with a general improvement in building materials that houses of any pretensions were possible, and the modern house may be said to date from the invention of properly-constructed flues and fireplaces. That the "fire-house" should reach from floor to roof would seem to have been a structural necessity, that the smoke might find means for dissipation. With improved arrangements the two-storied plan became general.

The builders of the English house had no precedent to go on. The Roman warmed his house by a hypocaust, a method presumably too intricate for our forefathers. But when the problem had been solved, probably by the Italian architects who flocked over here in Henry VII.'s time, we get the great English houses like Longleat, Hengrave Hall, Hatfield, and Penshurst. As to the materials of which houses were built, it was necessarily a local matter. They were for the most part entirely of timber, which made their improvement difficult. The spaces between the quarters were filled with cob, a mixture of earth and straw, or with lath and plaster. Plaster of Paris was largely employed in the thirteenth century. Bricks did not come into use until the fourteenth century, and could then have been only locally obtainable. But cob was exceedingly durable so long as the weather was kept out of it, and was constructed in layers or sections, with the straw put transversely and trimmed off afterwards. There are many such walls in the West of England now. They were constructed by an artisan called a "mud plasterer." Other trades one meets with were those of the torcher, who filled in between the quarters, barrow men, masons, carpenters, and tilers. Oak shingles were, for the most part, used for roofing, but in London, as early as 1189, an assize of merchants was convened to discuss any possible remedy against the frequent and destructive fires, and tiled roofs were advocated and became more frequent. Stone party walls were also judged as desirable, and special directions were issued as to how thick these should be built, and as to ownership. Three feet was the thickness prescribed, one-half on each owner's land, and either might raise it at his own expense. It should be noted, too, that neither, when raising, could obtain an easement of light in such a wall.

It was necessary that a house but insufficiently warmed should have as few and as small apertures in it as possible; hence the windows were of meager description. Glass was rare before the sixteenth century, and the "wind-holes" or "loop-holes" were closed by a shutter or covered by canvas. Floors, originally of beaten clay, were later paved with flag or cobble. The walls were plastered and colored or whitened. The author instances a number of cases in which "archil" mixed with lime was employed, which produced a deep blue wash; or copperas was used, which imparted a green tone.

Floors were paved with flag or cobble. Upon the former, patterns were sometimes drawn with pipeclay, after the manner of the pavement artist. The thresholds of cottages and stables are still sometimes embellished in this manner.

Thus far we travel in the author's company; beyond this he does not take us. The distance covered is not great, for he leaves the hut style still predominant. All reminiscences of hut architecture had to be abandoned and the single chamber accepted as a focus only of a plan providing for the necessaries of a more civilized life, before a really important advance occurred. It cannot be doubted that this end was accomplished by grafting the more elemental idea upon principles of house planning which had been long since laid down.

The Greek, the Roman, the Cairene house, had all taken the same form, and the English house, when it began to develop at all, prepared to follow it. It is only the hut which is rectangular; a house begins to shape itself and group its plan around a court on two, three or four sides. A wing thrown out from the rectangular plan, forming two sides to a stock-yard, is the first step, and so we reach the more elaborate grouping of the sixteenth-century house, with court and grass-plot and sundial. We are never likely to return to the simplicity which has been presented to us. An additional number of rooms for sleeping accommodation especially has become necessary to us. But we may very well consider whether the middle-class house, which is but a bastard affair, and a poor imitation of the large Elizabethan house, may not be simplified. Three small reception-rooms, which are now thought to be so necessary for a house of this class, are, we think, both useless and uncomfortable. There is no space or pleasure in any one of them. A larger room as a living room is, we feel sure, a most desirable thing, and may easily be obtained by reducing the size of the two remaining rooms. A much smaller withdrawing-room or "bower" and a still smaller study or writing-room—the *tablinum* of the Roman house—may fill the space left upon the plan. Since the hall should be something more than a passage and staircase, the *tablinum* may be a part of it, and occupy a bay curtained off. Except in a bungalow plan, it is not convenient to carry the chief room to the height of the roof, since the area of the first floor would be too much curtailed by so doing; yet this height might be most effectively attained when possible.

Consideration may also be given to the use of materials in mediæval times. Half-timber construction can only be used conditionally. An examination of old work will reveal the numberless patchings that the shrinkage and twisting of the oak quarters has brought about. Bitumenized fir is, perhaps, the safest timber to be so used. Teak is eminently adapted to the purpose, but it is costly. But plaster, in skilful hands, may be made much of, both ornamentally and constructionally. In the former direction its capacities are limitless, and only await the humor of the artist. As a building material also we believe that much more might be made of it than is done at present, particularly when laid upon wire lathing. Shrinkage is the one fatality that awaits the employment of wood in any form. The Paris Exhibition buildings are now being ingeniously erected in plaster laid upon an iron skeleton. Brick has, however, so entirely nationalized itself that its use is likely to remain general. If the size of a brick could only revert to the old measurements, which did not exceed some 2 inches in height, the effect would be far more pleasing. The Italian brick, for the most part, still adheres to these proportions, although a brick even larger than our own is unfortunately beginning to supersede it, in the laying of which we presume time is saved.

The book is one of the Social England Series, and is for popular reading. We sincerely hope that Mr. Addy may convince the yearly tenant that simplicity and even humility may be exhibited in the arrangements of a dwelling, and its comfort and dignity increased thereby. —Review from The Builder.

SOME eight years ago, the Waco Ice and Refrigerating Company, of Waco, Texas, built several cold-storage rooms. Recently changes were made which necessitated the tearing down of a wall in which "P. and B." Giant Insulating Paper, made by the Standard Paint Company, of 81–83 John Street, Manhattan, New York city, had been used. The workmen were astonished to find the paper apparently is as good condition as when it was first made. It had thoroughly resisted the dampness which naturally exists in the walls of cold-storage rooms.

* "The Evolution of the English House." By Sidney Oldall Addy, M.A. London: Swan Sonnenschein & Co.

REVOLVING WINDOW FIXTURES.

THE New Century Manufacturing Company, of 48 East Eighth Street, Manhattan, New York city, have introduced a new device for turning the sashes in windows so that they may be cleaned on either side from the interior of the room, while the cleaner remains standing on the floor.

AUTOMATIC REVOLVING WINDOW FIXTURES.

The patent automatic latch prevents the sash from being turned except at points indicated, consequently it cannot be revolved accidentally. By using the fixtures, all liability to accident is avoided; and step-ladders or window seats are not required.

The relative positions of the upper and lower sash can be changed so that the upper sash can be revolved in the place of the lower sash, bringing the outside of the window on the inside for cleaning, so that the window can be tightly closed to prevent drafts.

The most perfect ventilation can be secured, even in rainy weather; for the window can be adjusted at any angle, thus excluding the rain and admitting the air.

The window permits ventilation from top, bottom, and center at the same time, or independently as may be desired, thereby creating a circulation of air, and not a draft, as in the ordinary window.

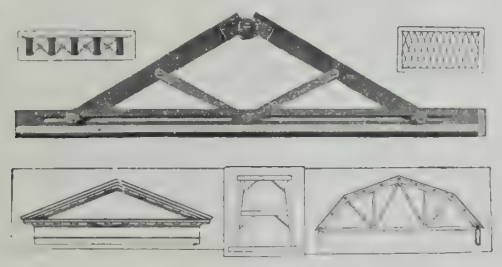
The fixture permits the window to slide up and down in the ordinary way, while both sashes can be revolved separately and independently; they may also be revolved together if desired, either at top or bottom of the frame, thus leaving the entire window space open for the purpose of ventilation, or to be used as a door.

The fixtures are durable and simple in construction. They can be easily and inexpensively applied to ordinary windows now in use without changing or destroying the frame or marring the window, as the present frame, sash, sash-weights, sash-cords, chains or ribbons, pulleys, beads, and parting strips are used.

The adjustable springs press the bars tightly against the sash when closed, make the window storm and dust proof, and prevent the window from rattling, while they automatically adjust themselves to the shrinking and swelling of the window, so that the sashes can be as easily raised and lowered in wet and stormy as in dry weather.

AN INGENIOUS ADJUSTABLE TRIANGLE.

MR. EDWIN H. WATERBURY, an architect, of Hillandale Park, Stamford, Conn., has invented an adjustable triangle for architects', engineers', and draftsmen's use,



WATERBURY TRIANGLE, AND SPECIMENS OF ITS WORK.

which facilitates the work of laying off angles, such as roof pitches or gable work, batter slopes, trusses, and any work requiring the use of triangles. Embracing as it does all angles from the horizontal to the perpendicular, it also takes the place of, and is an improved protractor, the index of the angles being graduated on the base or stock of triangle.

To adjust the triangle, it is necessary only to locate the index point on the washer at the base of the thumb-nut, at the desired point of graduation, and both right and left slopes of the angle required is the result.

The simplicity of adjustment, and the ease and rapidity with which one angle is changed to another, will commend itself to the draftsman. The advantage of having both slopes is very apparent; especially in laying out gable work, batter slopes or trusses, when both slopes have to be in use continually.

The material used in the construction of this device is as follows: The base or stock, boxwood; the blades, translucent celluloid. The metal parts are nickel-plated. The graduation and mechanism are as perfect as skilled mechanics and modern machinery can make them.

Mr. Waterbury has received very flattering letters of commendation from leading architects in New York.

PATENT ELASTIC FELT MATTRESSES.

A FEW years ago a billowy sack of feathers, piled mountain high upon a quaint-old-fashioned-four-post-corded-bottom bedstead, was considered luxury itself.

Then came the curled hair mattress, which, as an innovation, did not at first meet with favor, being regarded as a poor substitute for soft feathers. But the hair mattress, nevertheless, has simply upon its merits supplanted feathers entirely.

Inventive talent has evolved not only improvements upon the original hair mattress, manner of making, etc., but also a process by which another material, namely cotton, is converted into a most marvelously meritorious filling, superior in every way, even to the very best curled hair. This filling has been arbitrarily named and trade-marked "Patent Elastic Felt," by its makers, Ostermoor & Co., 116 Elizabeth Street, New York.

Patent Elastic Felt is made from purest selected cotton of especially long, tough fibers, which, after being picked, is thoroughly worked, then lapped, forming sheets, whereupon it undergoes a most vigorous chemical and mechanical treatment, to remove all trace of natural vegetable oils; and steamed, to expel all impurities; subjected to the most intense heat, strengthening the fibers, and so perfectly manipulated as to render it absolutely dry and non-absorbent. After all this it is

recarded, combed into sheets, and then through various processes made into light, airy, interlacing, silky fibrous sheets of wonderful elasticity and virginal purity, thoroughly sanitary.

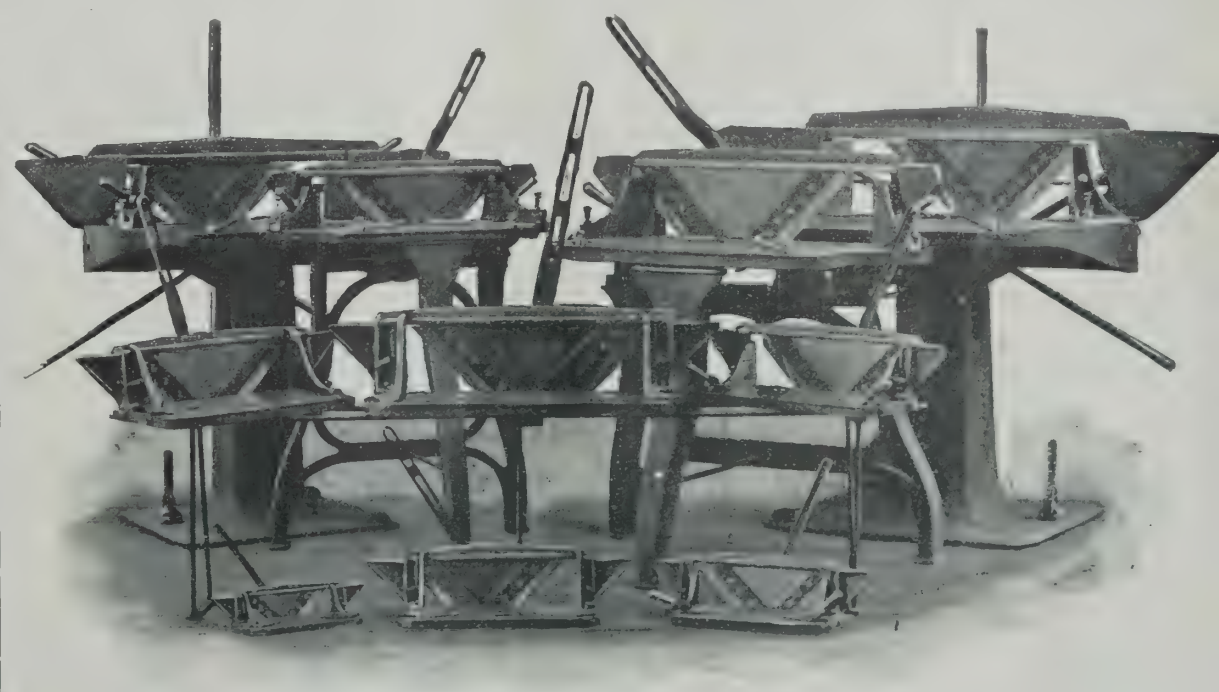
THE FOX UNIVERSAL WOOD TRIMMER.

THE Universal Wood Trimmer, for trimming pieces of wood smoothly and accurately on any angle, was patented in 1879 by Mr. W. R. Fox, President of the Fox Machine Company, of Grand Rapids, Mich., and was first placed on the market in 1885. Since that time twelve additional patents have been granted on improvements.

The 4A machine was the first size built. It is now to be found in the most progressive pattern shops in the world, over 8,000 having been sold. Two styles of bench trimmers are now made, one in two and the other in four sizes. The "Style E" is made in two sizes, both serviceable tools. The "Style F" machines are the largest trimmers made, and likewise the most perfect in design and workmanship.

Owing to the fact that pattern work requires such an excessive amount of accurate cutting and fitting, as is well known, the time saved by the use of these tools, which will trim the ends of a roughly sawed piece of wood absolutely true in a moment, will be readily appreciated. However, Fox trimmers are also adapted to the economical preparation of interior finish for buildings, cars, ships, etc., as well as to any other branch of woodworking where accurate joints are essential.

In cutting and fitting pattern work, almost every piece must ordinarily be trimmed off at some angle at both ends. That Fox trimmers will perform this work quickly and accurately, with but one stroke of the knives, speaks well for their efficiency. It is no longer necessary to put the piece of wood in a vise, to use a butt-plane, then a smoothing-plane, together with a try-square; for all this work is performed far more neatly and expeditiously by the universal trimmer.



THE IMPROVED FOX UNIVERSAL WOOD TRIMMERS.

Fox trimmers are not made on contract, but are built from the casting to the finished machine (including the knives) in the Fox plant, complete in every detail, fitted with the most modern machinery, the greater part of which is of the company's own special design.

Ornamental and Architectural Wire, Iron, and Brass Work.

THE use of ornamental wire, iron, and brass work has become so widespread that builders desirous of securing the best patronage are compelled to devote considerable attention to this line of building.

To meet the requirements of builders throughout the country, the E. T. Barnum Iron and Wire Works, of Detroit, Mich., have introduced high grade ornamental and architectural wire, iron, and brass work, far better than anything of the kind ever placed on the market before. This is proven by the remarkable selling record of these goods in 1899, which, judging from the present indications, will be equaled, if not surpassed, during the present season.

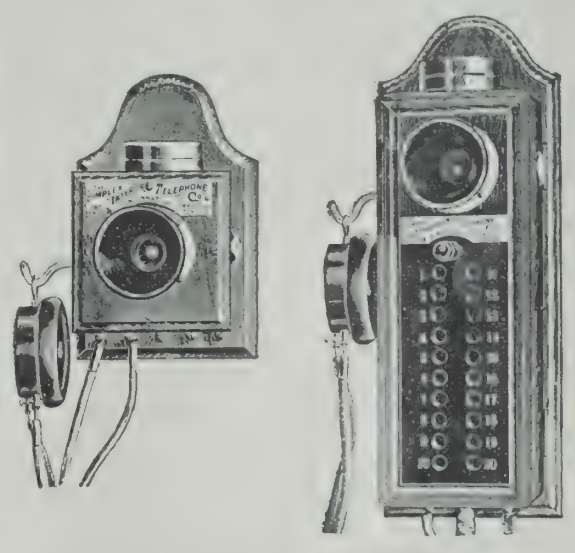
The firm has just issued catalogues to the trade as follows:

No. 1292, of Wire and Iron Fencing; No. 1294, of Builders' Wire and Iron Work; No. 1296, of Bank and Office Railing; No. 1297, of Jail and Prison Work; Special, of Drinking Fountains; Special, of Display Fountains; No. 1300, of Lawn Statuary; No. 1255, of Fireproof Vault Doors; No. 1075, of Cemetery Vault Gates; No. 1080, of Elevator Cabs and Enclosures; No. 1301, of Sash Bars; Special, of Weather Vanes.

Any catalogue can be obtained on request.

RESIDENCE AND APARTMENT HOUSE TELEPHONE SYSTEMS.

BY the use of the telephone many steps are saved. A telephone once properly installed requires little attention. The apparatus shown in the illustration occupies but 4½ x 6½ inches of space, and is intended for lines up to one thousand yards in length. It is primarily for single line service, but may be adapted by special wiring to connect from three to six points—a range covering



TWO INTERIOR TELEPHONES.

ordinary residence as well as simpler business requirements.

The great demand for more extensive interior systems for apartment houses and commercial buildings is met by the intrument shown in the second illustration. This apparatus is an intercommunicating instrument adapted to twenty stations. A station is connected with any other at will, and any number of pairs up to the capacity of the instrument may converse at the same time without interference. The entire system is operated from one set of batteries, and no central exchange is required. Such a system is suitable for many purposes, and is, above all, economical. The instruments are of neat and compact design. The Interior Telephone Company, of Cincinnati, make a specialty of this class of work.

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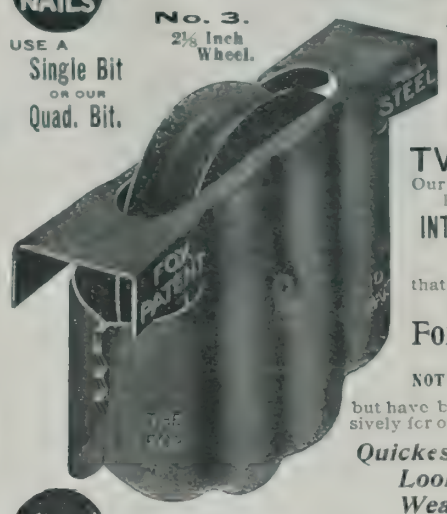

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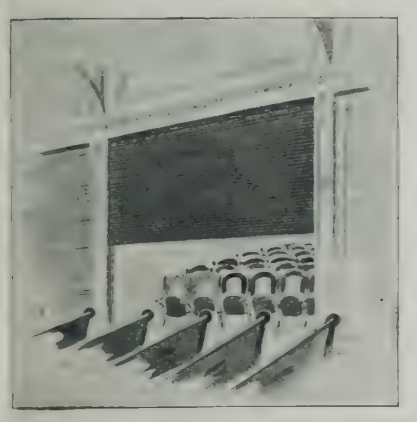

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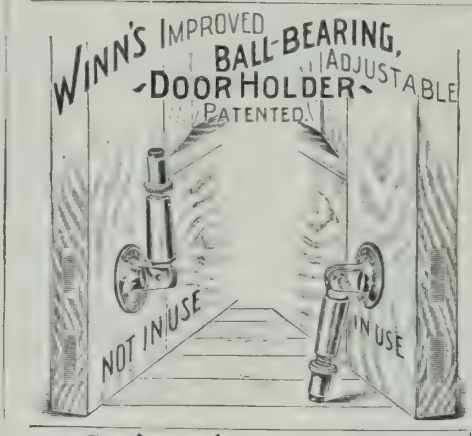

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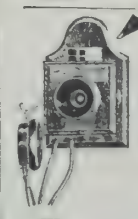

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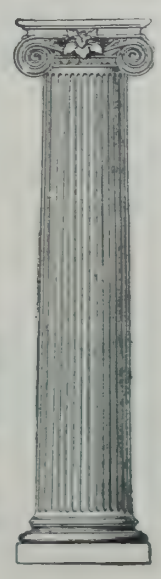

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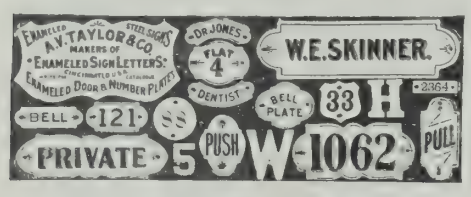

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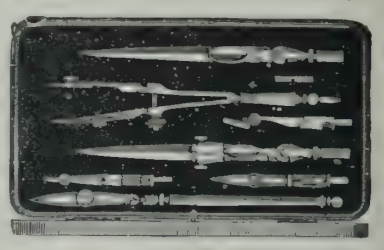

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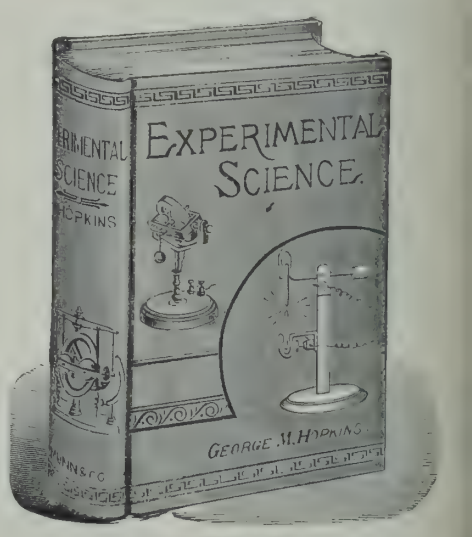

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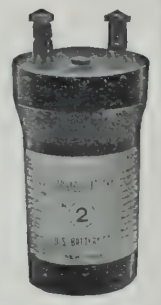

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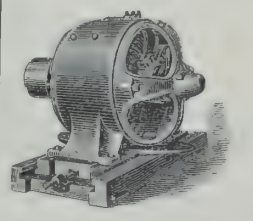

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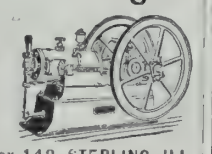

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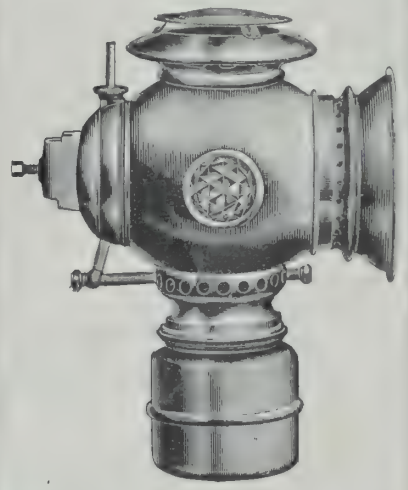

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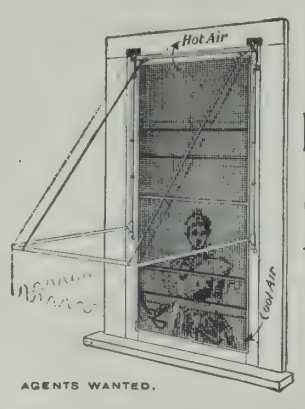

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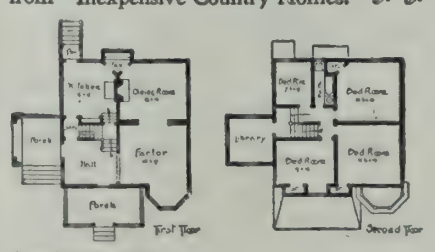

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A TILE FRONT OF A RUSSIAN SANCTUARY AT THE PARIS EXPOSITION.—See page 2.

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SOME ASPECTS OF SUBURBAN ARCHITECTURE.

THE movement of the population toward the cities has long occupied the attention of our social philosophers, and has occasioned much comment among those concerned with the problems of modern living. There are no signs of a lessening of this tendency of the country folk, but during the last few years there has been an emigration of the city folk to the country which bids fair to be quite as remarkable as the other movement. In many respects it is one of the most significant of recent movements of population, and the influence it will have on city and country alike, as well as upon the people themselves, is likely to be marked in many ways.

The city movement toward the country has two conspicuous results : It has occasioned the rapid opening up of the rural districts included within the areas of our great cities, and it has built up new towns immediately outside city limits, and led to the gradual transformation of all the territory adjacent to the large cities. This result has been accomplished through several agencies. The high rents demanded in the cities, the impossibility of obtaining desirable accommodations at reasonable prices, a condition that is especially characteristic of New York, the difficulty of bringing up families in flats and tenements, have all combined to turn the people toward the more ample room and the lesser rents of the country.

But living in the country, just as living in the city, is immediately dependent upon convenience and rapidity of transportation. And so it follows that the railroads and trolley systems form the first and most considerable factors in this new development. The transportation companies, both within and without city limits, have been quick to recognize the value to themselves in supplying the demand created by this new aspect of city life. City trolley systems have been extended to the rural regions of the city itself, and all our great cities, New York, Chicago, Philadelphia, Boston, Cincinnati, and many others, now have trolley lines that literally run through miles of country territory. The steam railroads that reach farther afield have been equally prompt in the establishment of a local train service that surpasses the city trolley in swiftness and convenience. And so admirably has this system been developed that there is no longer need for any one to live in the city. When it takes longer for the resident of Harlem to reach the New York City Hall than it does the resident of a pleasant country town in New Jersey, it would almost seem that the city as a place of residence had ceased to exist.

That, of course, is not likely to happen in the lifetime of any person now living ; yet the movement from the city to the country has now reached so marked a point that it would be rash to prophesy what the future may hold. Meanwhile it may not be amiss to briefly consider some of the circumstances that render suburban life desirable, and to note some of the conditions that have brought about its present popularity.

Suburban life within city limits does not differ materially in many instances from life in a suburban town. Brooklyn, for example, contains many thriving and popular suburban settlements that are farther, in point of time, from the City Hall in Manhattan than many places in New Jersey. The City of New York, since the consolidation that made the greater city, contains thousands of acres of farming lands, and little country villages that are as rural as any town a hundred miles from the metropolis. But Brooklyn offers a good example of the tendency toward suburban life within city limits, for many of the newly opened districts are quite close to the built-up portions. A bird's-eye view of Brooklyn would show a thickly built central portion, reaching to the East River on the west, surrounded on the other sides by a circlet of small settlements that are essentially suburban in their general aspects. That is to say, the streets are macadam roads rather than city thoroughfares ; the houses are of picturesque design, spaced within lawns of green or surrounded with flowerbeds and shrubbery. If the streets are not lined with trees, it was because the district before renovation possessed no trees, and the newly planted ones have not yet had time to make a distinct note in the landscape.

The reason of the success attending the creation of these suburban regions is now apparent. It is the open space and the free air that people crave, and which they will have, even if stores be rare and delivery services not always of the best. But these latter defects in country living are being rapidly bettered, and do not appear to operate disadvantageously in the new development : they are drawbacks felt more by those accustomed to the immediate proximity of city conveniences in the crowded parts rather than real and material drawbacks.

The part of the architect in this work is of the utmost importance, and has been, in its way, as valuable as rapid trolley service. Popular interest in architecture is nowhere better shown than in the artistic development of the suburban residence. The standard demanded for these buildings is frequently high, and it is an interesting fact that the higher the standard, the more elaborate the dwellings—within reasonable limits—the more pleasing and more artistic the house, the more successful the property on which it is built. People in purchasing a home are more apt to consider its artistic effect, as well as its convenience, than they perhaps are aware of. Convenience of interior, suitability, labor-saving devices, all help in the sale of suburban houses, and all enter into the successful development of a suburban locality. But it has long been an imperative necessity that both the suburban and the country house must exhibit at least some attempt at artistic treatment, and hence the importance of the architect in this work.

One feature of suburban life that is closely connected with architecture is the fact that each new locality, developed, as many of them now are, under a single speculative impetus, has an average of its own. The houses, as a rule, are of similar cost, and hence similarly moderate or similarly expensive. People enjoying similar incomes are likely to settle in localities suited to their means, and hence a certain social atmosphere is created which is likely to be permanent. This condition obtains only where the property that it is proposed to develop is under one ownership : where a new tract with multiple ownership is opened up through the advent of trolley cars or the making of new roads, there is likely to be a diversity of both residences and people.

It is a prime essential of suburban living that the dwelling and its surroundings be agreeable. The house must be pleasant to look at and convenient to live in ; it must be supplied with those multifarious devices called "modern conveniences" ; the surroundings, the lawns, the trees, the flower-beds, the streets and paths, must be as delightful as they can. Unless suburban activity is undertaken on the basis of a liberal expenditure, the result is likely to be profitable to no one and satisfactory to none. Brooklyn contains two localities, among others, which offer a sharp contrast in suburban development, and very clearly show how to succeed and how to fail. These are the 26th and the 30th Wards. The former is the largest ward in the city and is locally known as East New York. It is the only ward in Brooklyn that is conveniently served by the two elevated systems of the borough ; its trolley service is less developed, but is used to a considerable extent. It still contains many flourishing farms, and is therefore essentially suburban, if not actually rural. Yet with the advent of the elevated roads came small houses for poor people, built in rows, and crowded together as in the oldest parts of the city. Many poor families, to whom time was of no consideration, and who would cheerfully travel long distances in the search for low rents, made their homes in the ward. Its growth has, therefore, been slow and almost wholly in the unfortunate manner marked out for it at the beginning. No doubt the people who live in it are entitled to do so, but a more enlightened policy at the beginning, the building of detached or semidetached cottages, the interspersion of a little grass and a little free air besides that of the streets, would have wrought a change, at once architecturally and socially beneficial.

The history of the 30th Ward is in marked contrast. This ward contains the well-known suburbs of Bensonhurst, Bath, and similar places, directly on the ocean. If the development of these districts has not always been characterized by the highest skill, it has at least been carried on in the right direction. Houses of a good quality have been built, much property being restricted in that respect. And with excellent houses, well designed, pleasantly environed, and supplied with the latest devices for living, have come people of a good sort, who have given to this district a social life that has materially helped in its prosperity. The 30th Ward of Brooklyn is a delightful locality, with many fine streets and agreeable houses, and all the outward characteristics of a successful suburban locality. The 26th Ward has none of these qualities, and is fast becoming a closely built up portion of Brooklyn.

How very important good architecture, architecture that looks good as well as is good, may be in the development of suburban localities is well shown in some of the new districts that have recently been opened in Philadelphia. Overbrook and Pelham are two districts that stand for about as highly developed suburban regions as may be found within any Eastern city. Finely graded streets, with sewers, gas and electricity, were the first consideration. Then the promotors engaged the services of a number of competent architects, and houses of a high grade were erected, all of fine architectural design and great beauty. Ample provision was made for lawns and open spaces, with the resultant creation of a very charming suburb that bears every evidence of outward prosperity. The strongest element in the success of these localities is the beauty of the architecture of the houses and their fitness for their localities. These qualities appear indispensable in the successful development of a suburban district.

AN ITALIAN VILLA AT BELLE HAVEN PARK, GREENWICH, CONN.

WE present as the subject for colors, and also on pages 4 and 5 in this issue, an Italian villa, which has been erected for Stanly B. Tyler, Esq., at Belle Haven Park, Greenwich, Conn. The design presented is unusual in its beauty, and it is treated in a pure Italian style. The features of the exterior are the entrance porch with columns, and the terrace and arbor at the rear of house, which is a most excellent feature, and is reached by the main hall, which runs from front to rear. This terrace is walled up with stucco-work and is paved with red brick, while the arbor overhead is built of wood and supported on columns with Ionic capitals. The building throughout is built of stucco, rough coated, and the whole color scheme is most effective with its pure white body, its apple-green blinds, and its brilliant red roof. This roof is covered with shingles. The stable is carried out in a similar style and color scheme. Dimensions: Front, 72 ft. ; side, 30 ft., not including piazza and terrace. Height of ceilings: Cellar, 7 ft. ; first story, 10 ft. ; second, 9 ft. The interior arrangement is most excellent and ideal for a summer home, with large, airy rooms extending from one end of the house to the other, and presenting an excellent opportunity for light and ventilation. The main hall contains an ornamental staircase of Colonial style, with newels, posts, balusters, and treads painted china white, while the rail is turned out of mahogany. The trim in this hall, and also in the remainder of the house, is treated with china white. The hall has a paneled wainscoting, five feet in height, and a hardwood floor. This hall is separated from drawing-room by a broad archway, supported on massive columns with Corinthian capitals. The drawing-room is a spacious apartment, and it contains a broad open fireplace, with tiled facings and hearth, and a Colonial mantel made from special design. The dining-room, of large dimensions, is also provided with a paneled wainscoting, five feet in height, and an open fireplace built of brick, with hearth and facings of green mottled tile, and a mantel of Colonial style with columns. The butler's pantry adjoins this room, is connected to kitchen, and fitted up with bowl, dresser, closets, and cupboards. The kitchen is provided with stairs leading to cellar and to second floor, dresser, and fireplace, with Richardson & Boynton range. The laundry is provided with tubs, and adjoining laundry is the servants' bathroom, fitted up complete. The second floor contains a sitting-room, which can be used for a bedroom if desired, four bedrooms with large closets, two servant bedrooms, and two bathrooms. The bathrooms are furnished with porcelain "Standard" bathtubs and J. L. Mott's fixtures, with exposed nickel-plated plumbing. A cemented cellar contains a Richardson & Boynton furnace, and other necessary apartments. Mr. F. G. C. Smith, architect, Greenwich, Conn.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A TILE FRONT OF A RUSSIAN SANCTUARY AT THE PARIS EXPOSITION.

ON first page we present a remarkable example of the use of polychromatic tiling for church use. The Greek Church always has at the rear of the chancel a kind of tabernacle, and the one shown is made entirely of richly colored tiles, which form the architectural features of construction and serve to enframe the paintings. The style is particularly rich, and the whole is most pleasing.

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A MODERN RESIDENCE AT PATERSON, N. J.

WE present herewith on page 7, in this issue, a modern residence which has been recently completed for P. R. Rowson, Esq., at Paterson, N. J. The design is treated in a simple, graceful manner with artistic effect. The underpinning is built of red brick laid up in red mortar. The superstructure is of wood, and is covered on the exterior framework with sheathing and paper, and then shingled and left to weather-finish a natural silvery gray. The trimmings and blinds are painted cream white. The roof is also shingled and finished similar. Dimensions: Front, 36 ft.; side, 52 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior arrangement is most excellent, and the whole is trimmed with whitewood and painted white. Vestibule is paneled, and is provided with a tiled floor. The hall is an attractive apartment, and is treated in an effective manner with a high paneled wainscoting. The length of the room is divided by columns with carved capitals rising up to ceiling. The stairs are of very handsome design, and are provided with ornamental balusters and posts, the whole of which is treated in ivory white, while the rail is of mahogany. The parlor, of good dimensions, is provided with bay window, and it contains an open fireplace, with facings and hearth of light blue tiles, and mantel of dainty design. The dining-room, of square dimensions, is well treated. The butler's pantry, kitchen, and its apartments are provided with all the best modern improvements. The second floor contains four bedrooms, large closets, and bathroom, the latter paved and wainscoted with tiles, and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains servants' quarters and ample storage room. A cemented cellar contains furnace, laundry, and other necessary apartments. The house is built in a thorough, substantial manner, and all the exterior walls are filled in with brick. The house cost $5,000 to build, including furnace and everything complete. Mr. Charles Edwards, architect, Paterson, N. J. All plumbing fixtures were furnished by J. L. Mott Company; mantels and tiles by Jackson & Co., both of New York. The contractors were as follows: Builder, James White, of Paterson, N. J.; painter, A. Garrison, Paterson, N. J.

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VIEW OF THE STAIRCASE HALL IN "THE BREAKERS," NEWPORT, R. I.

A MODERN COLONIAL DWELLING AT SPRINGFIELD, MASS.

THE engravings on page 13, in this issue, present a modern Colonial dwelling which has been erected for Messrs. J. D. & W. H. McKnight, at Springfield, Mass. The design presented has many excellent features, and its lines are well broken by numerous bay windows, piazza, and latticed windows. The underpinning is built of red brick laid up in red mortar. The superstructure of wood is covered with sheathing, paper, and clapboards, and is painted Colonial yellow with white trimmings. The roof is covered with shingles, and is stained with moss green. Dimensions: Front, 31 ft.; side, 32 ft. 6 in., not including piazza and bay window. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior is most excellently arranged, and is finished off in a very handsome manner. The entrance is through a vestibule with a tiled floor and paneled wainscoting. The reception hall contains an ornamental staircase, separated from hall proper by columns rising to ceiling and forming an arcaded effect, while the spaces between same are filled in with balusters and spindle transom. This hall has a paneled wainscoting and massive ceiling beams. The parlor is treated in white enamel, and it contains an open fireplace furnished with white enamel tile facings and hearth, and mantel of excellent design. The dining-room is trimmed with oak, darkened to imitate antique oak. It has a paneled wainscoting, ceiling beams, and a bay window thrown out at one side, and also a china cabinet built in, with leaded glass doors. The butler's pantry and kitchen are trimmed and wainscoted with yellow pine, finished in hard oil, and are fitted up with the best modern fixtures. A good sized lobby at side is large enough to admit ice-box. The second floor contains four bedrooms and bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed plumbing, all nickel-plated. This floor is trimmed with white pine and is treated in colors. The third floor contains two bedrooms and one trunk-room. A cemented cellar contains furnace, laundry, and other necessary apartments. J. D. & W. H. McKnight, architects, Springfield, Mass.

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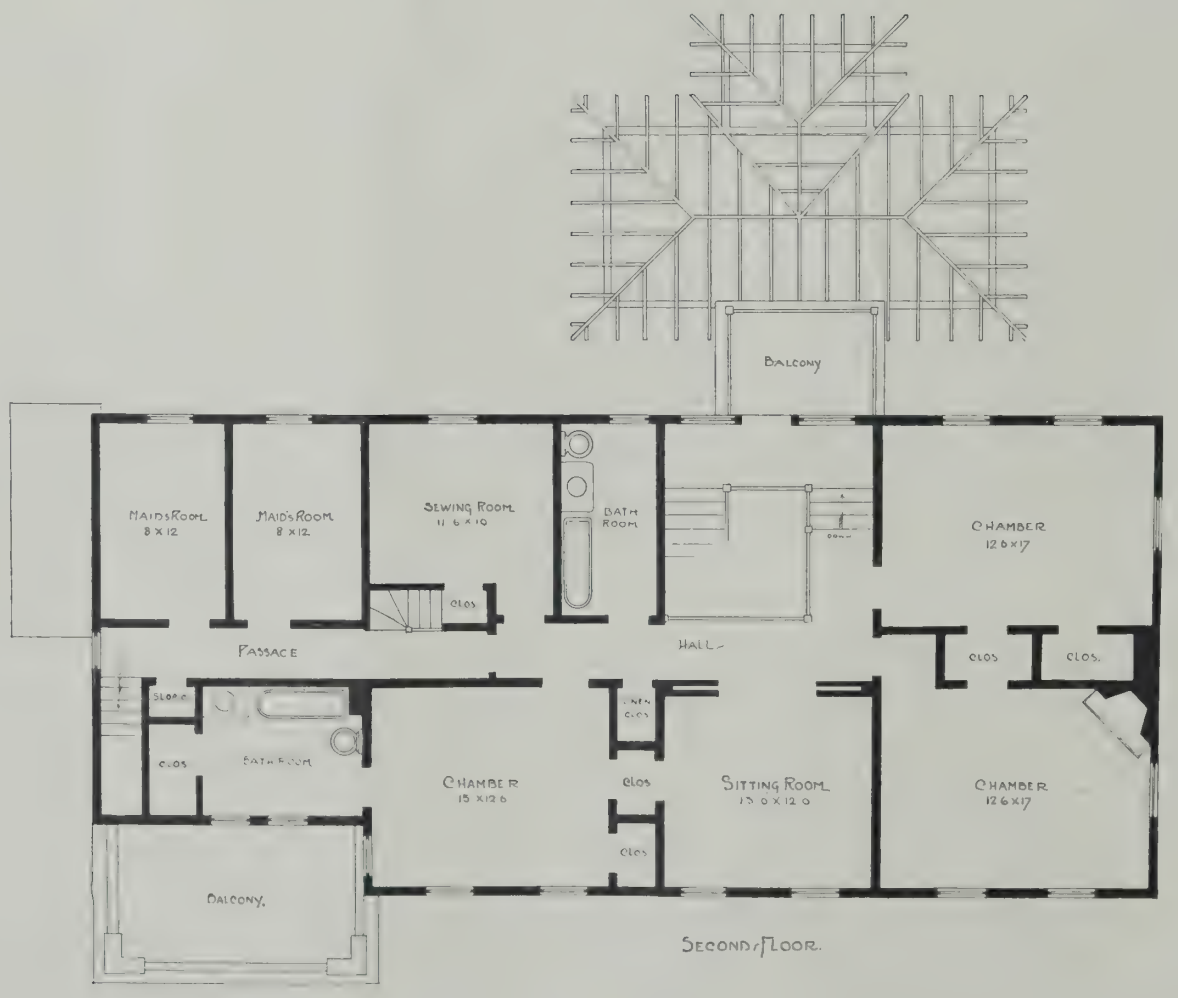

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MR. F. G. C. SMITH, ARCHITECT.

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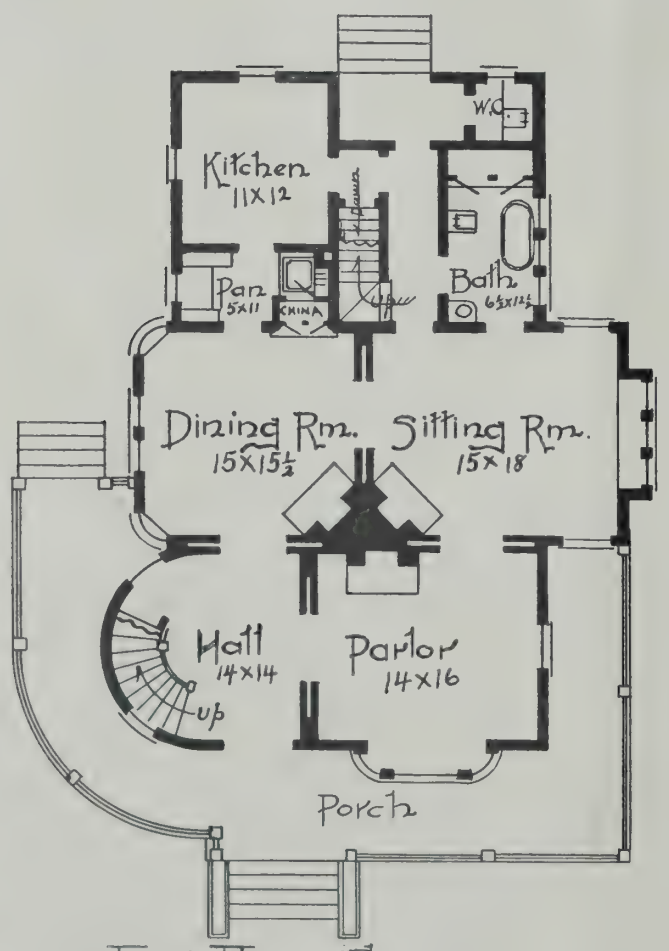
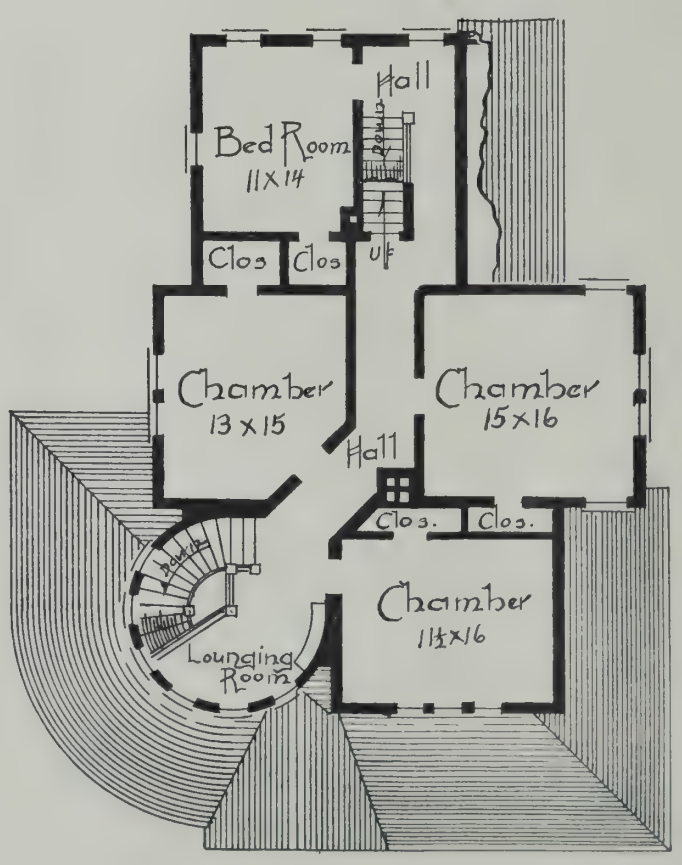


First Floor Plan



Second Floor Plan

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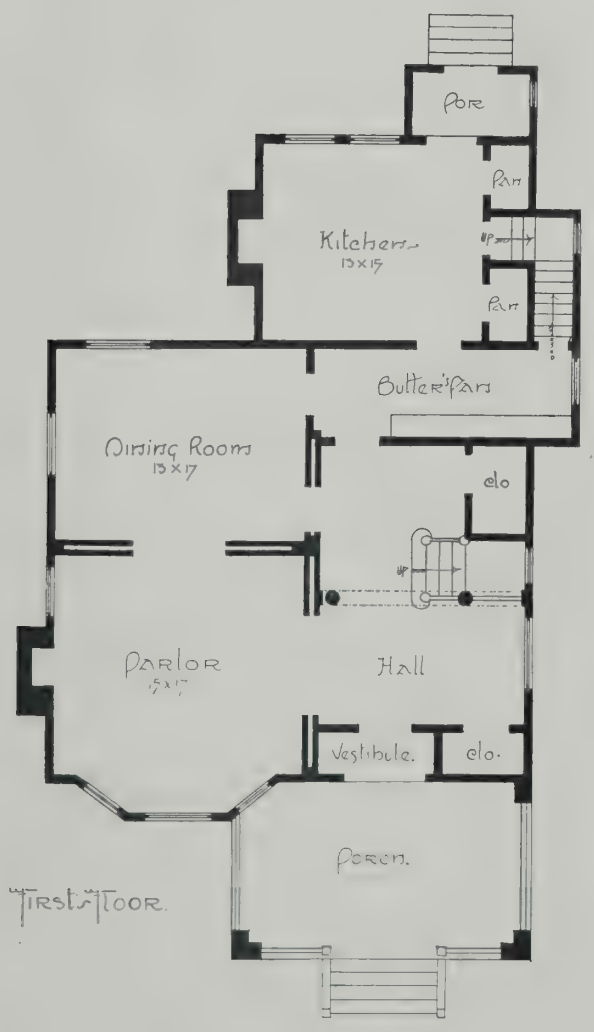
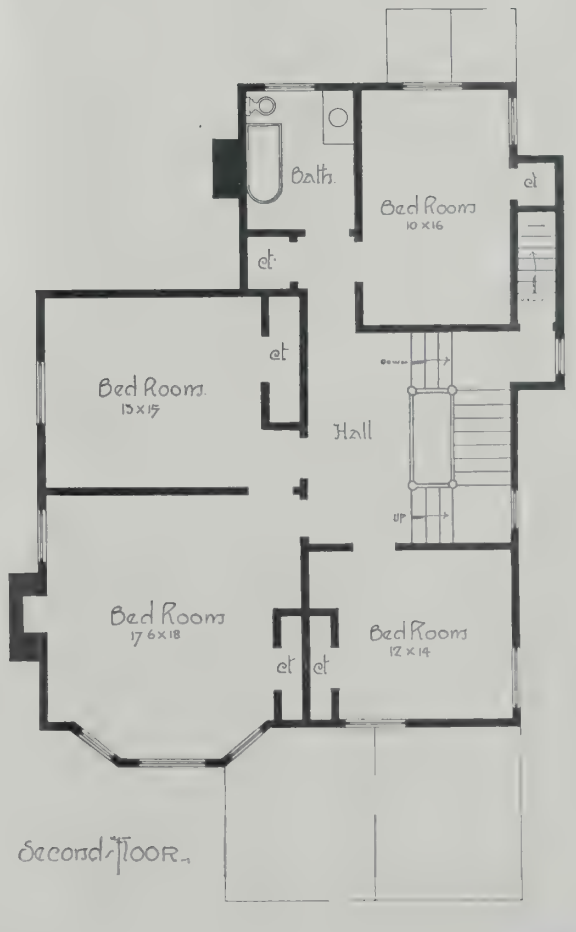
A RESIDENCE AT GREENSBORO, N. C.—See page 17.

MESSRS. GEORGE W. PAYNE & SON, ARCHITECTS.





A MODERN RESIDENCE AT PATERSON, N. J.—See page 3.

MR. CHARLES EDWARDS, ARCHITECT.

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MUSIC ROOM—WEST END.

THE HEARST COUNTRY SEAT IN PLEASANTON, CAL.—See page 16.

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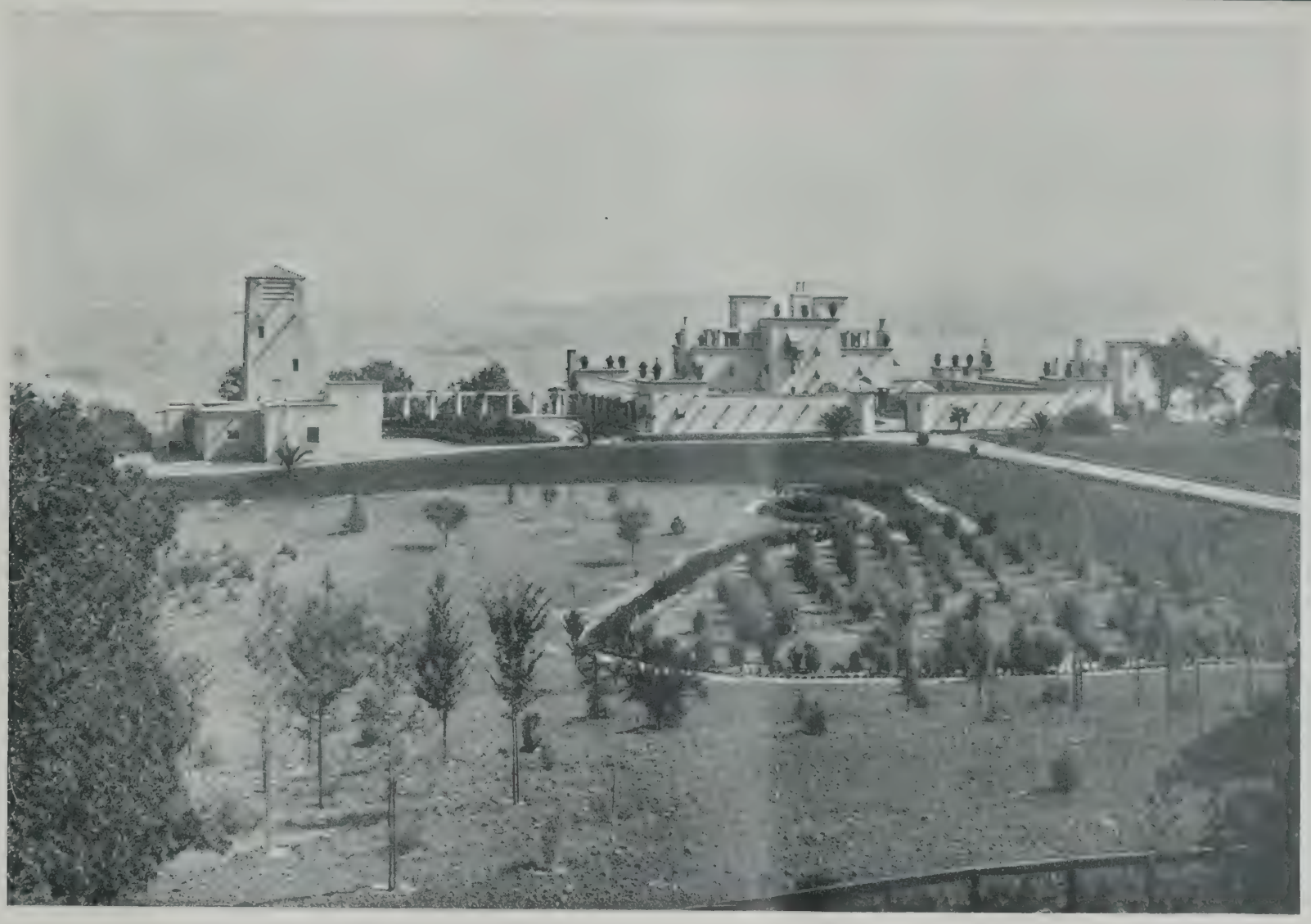

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THE HEARST COUNTRY SEAT IN PLEASANTON, CAL.—See page 16.

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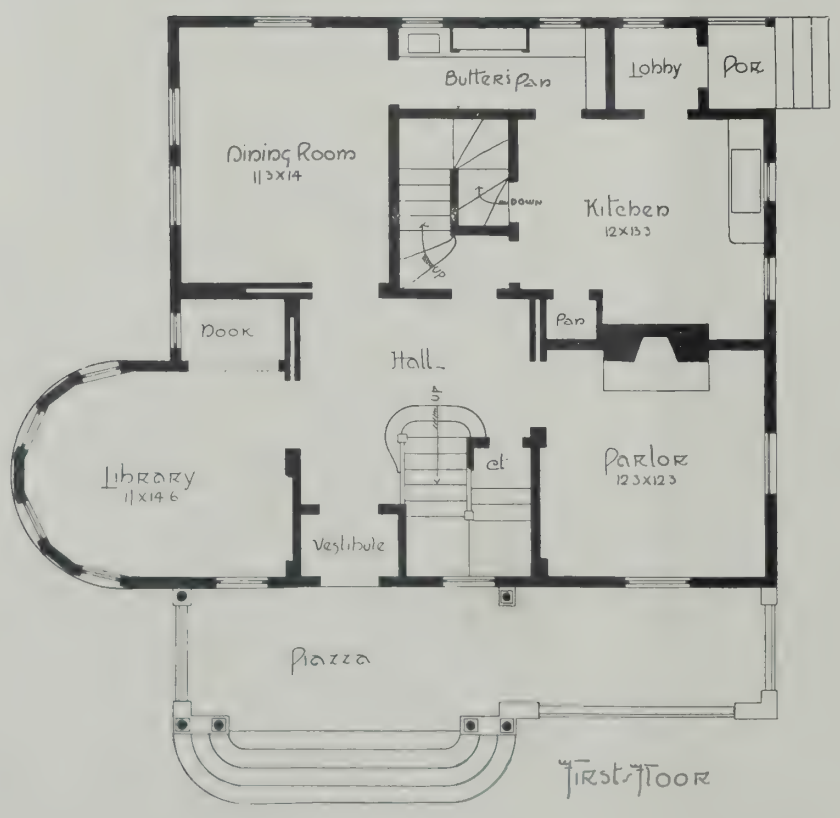

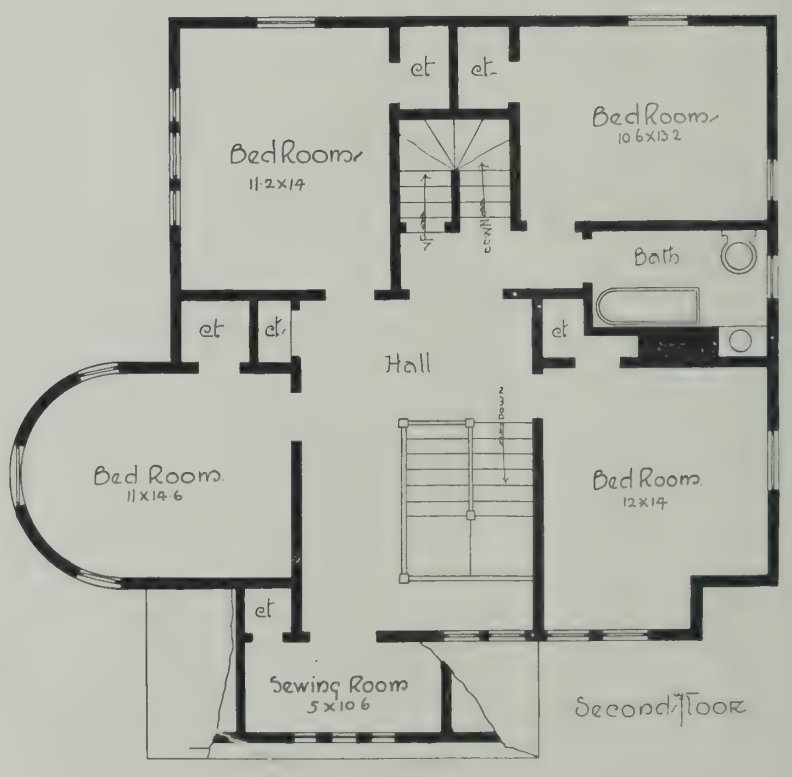

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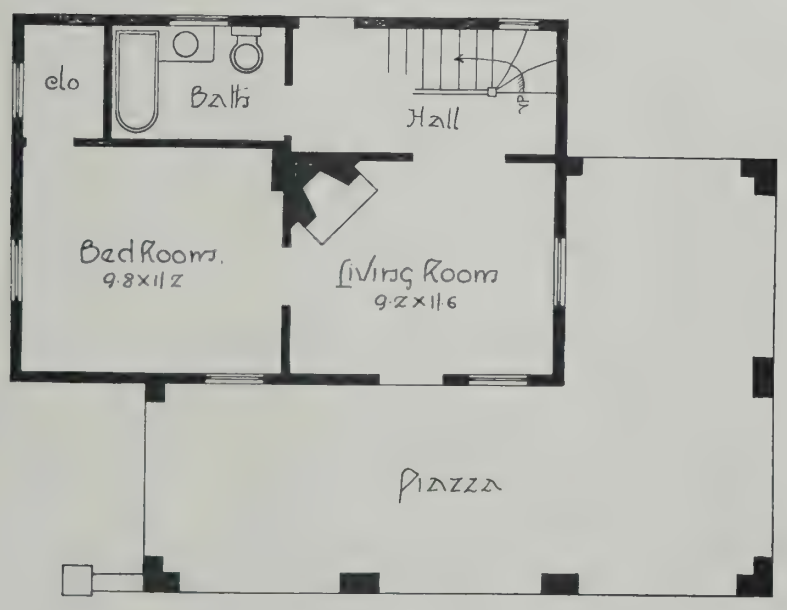
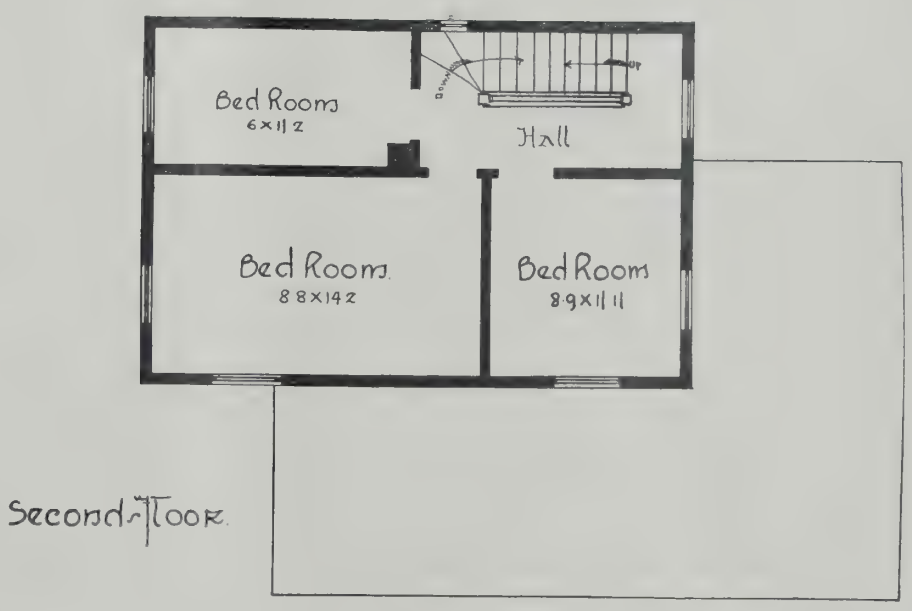
A MODERN DWELLING AT SPRINGFIELD, MASS.—See page 17.

MR. LOUIS FRANK NEWMAN AND CARROLL H. PRATT, ARCHITECTS.



First Floor.



Second Floor.

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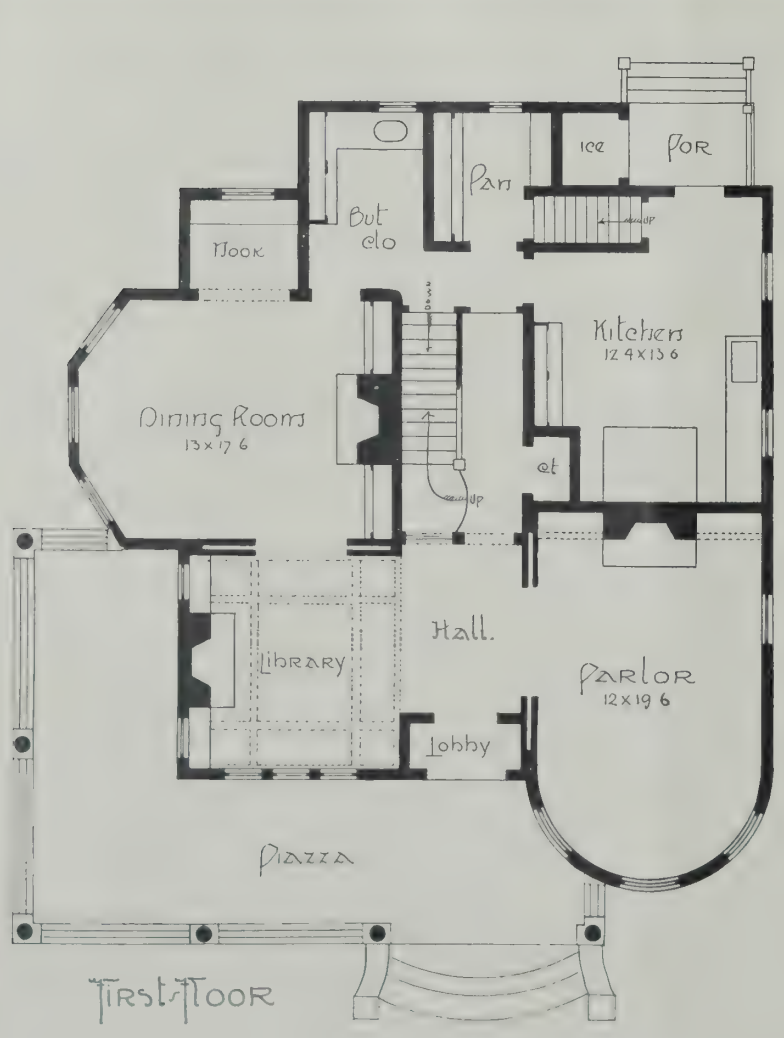
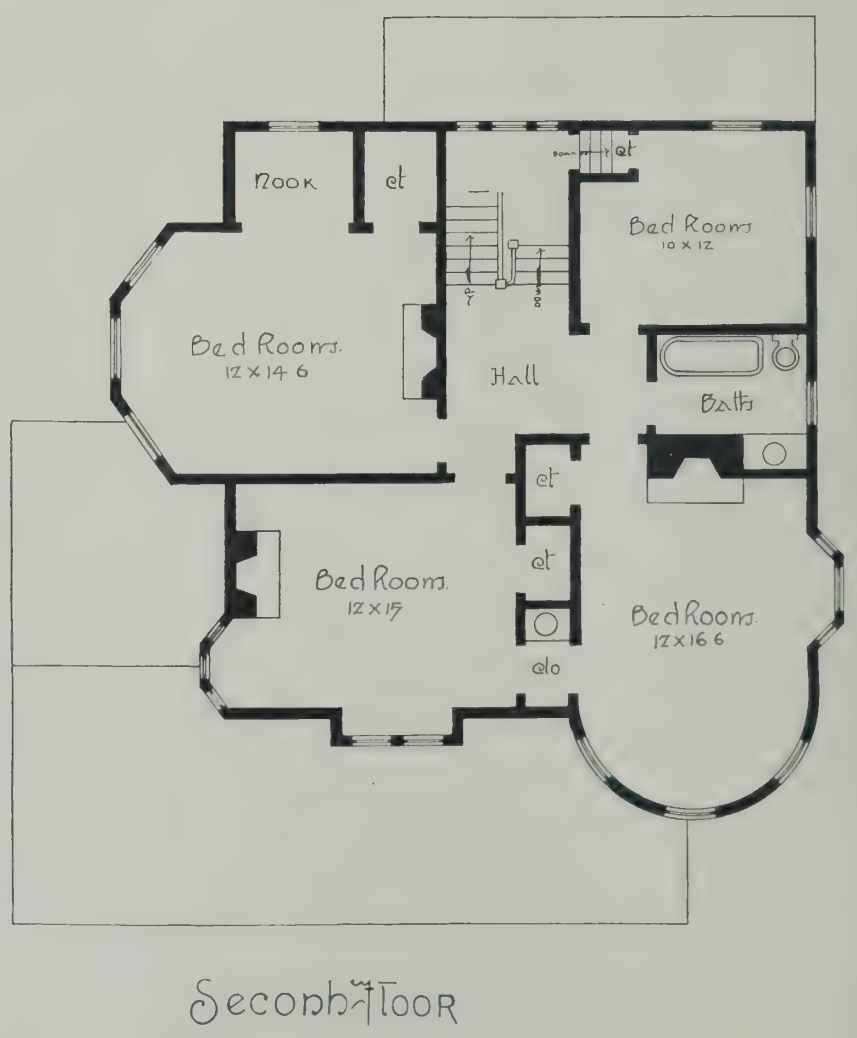
A DEAL COUNTRY CLUB COTTAGE AT DEAL BEACH, N. J.—See page 17.

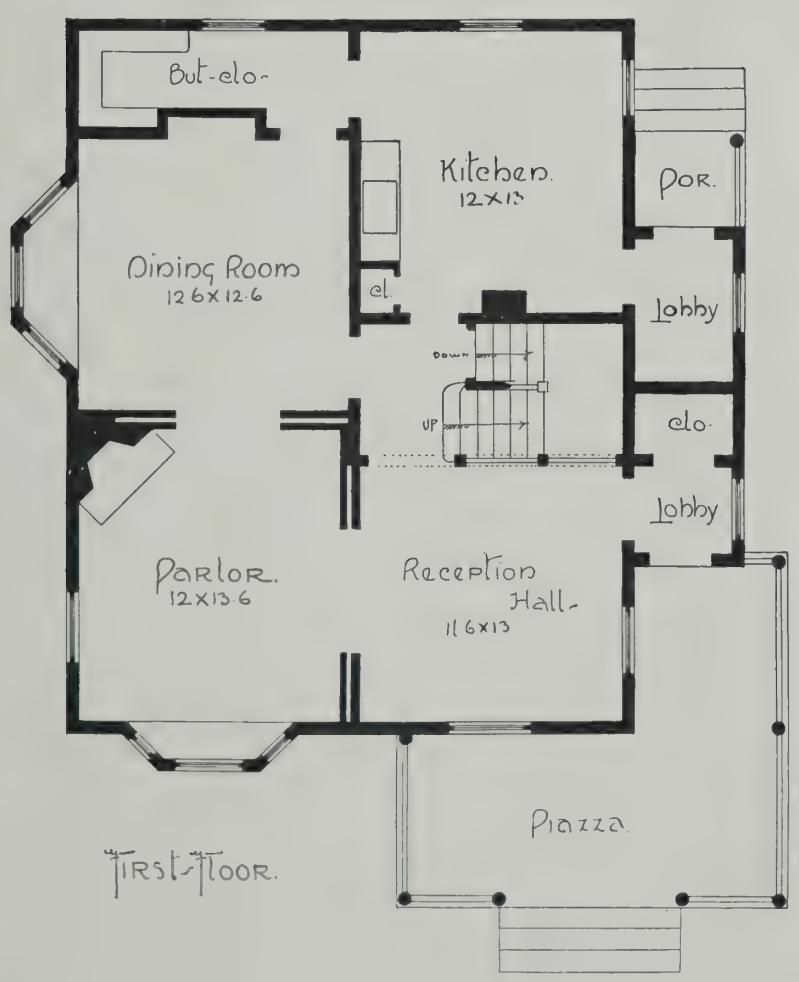
MR. WILLIAM GARDNER MASSARENE, ARCHITECT.





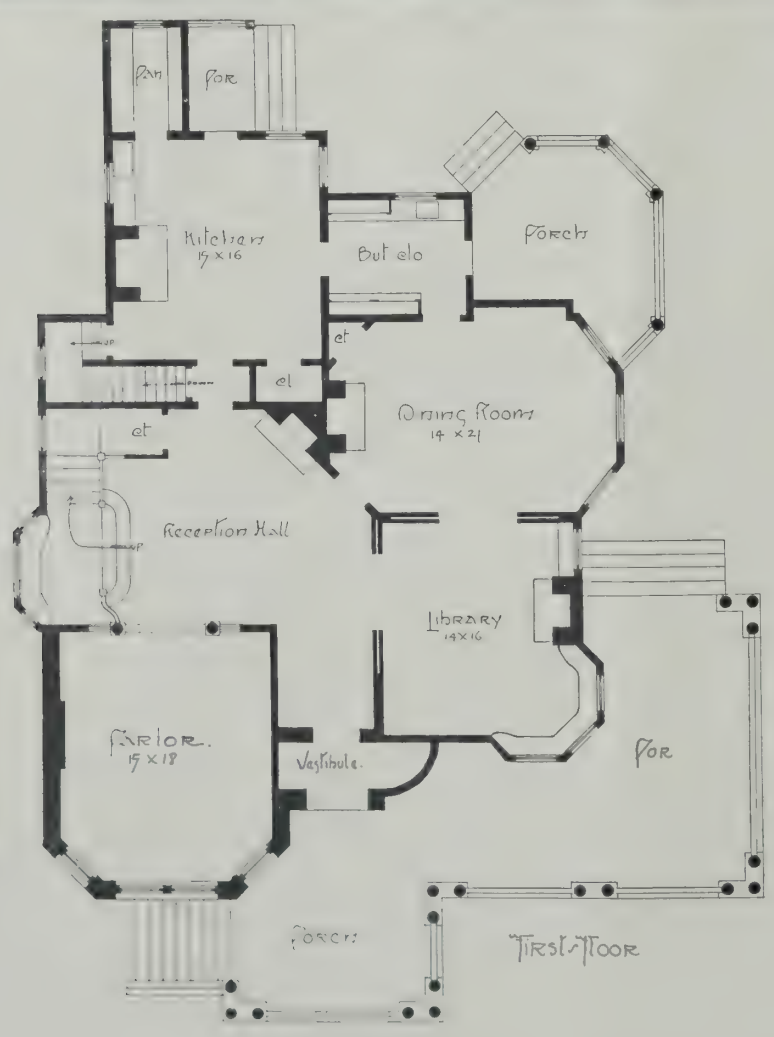
A MODERN DWELLING AT BENSONHURST, LONG ISLAND.—See page 16.

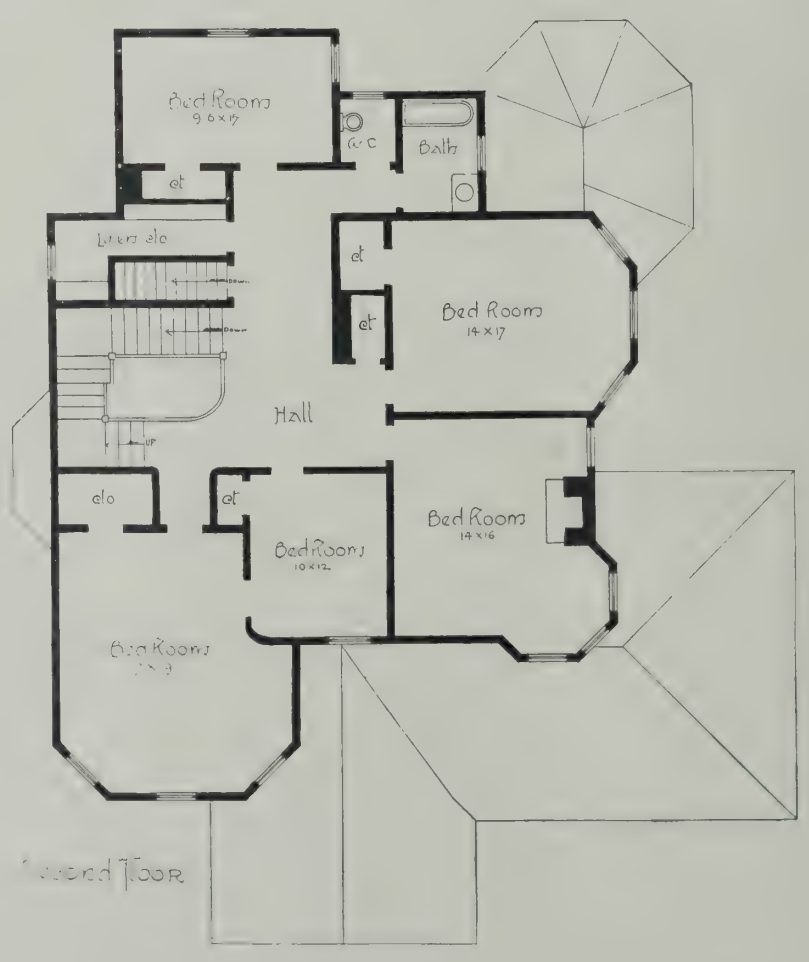
MR. WALTER JONES, ARCHITECT.



A MODERN COLONIAL DWELLING AT SPRINGFIELD, MASS.—See page 3.

MESSRS. J. D. & W. H. McKNIGHT, ARCHITECTS.





A MODERN RESIDENCE AT UPPER MONTCLAIR, N. J.—See page 17.

MR. CHRISTOPHER MYERS, ARCHITECT.

STAIR AND ARCH DETAILS.

WE have recently had many calls for interior decorative designs, and in consequence of these requests we have decided to devote a page in illustrating such designs of interior decoration as may be thought serviceable to our readers.

What we present on this page is the detail of a stair-case and archway in the residence of Joseph Bardsley, which we illustrate on page 14 in this issue

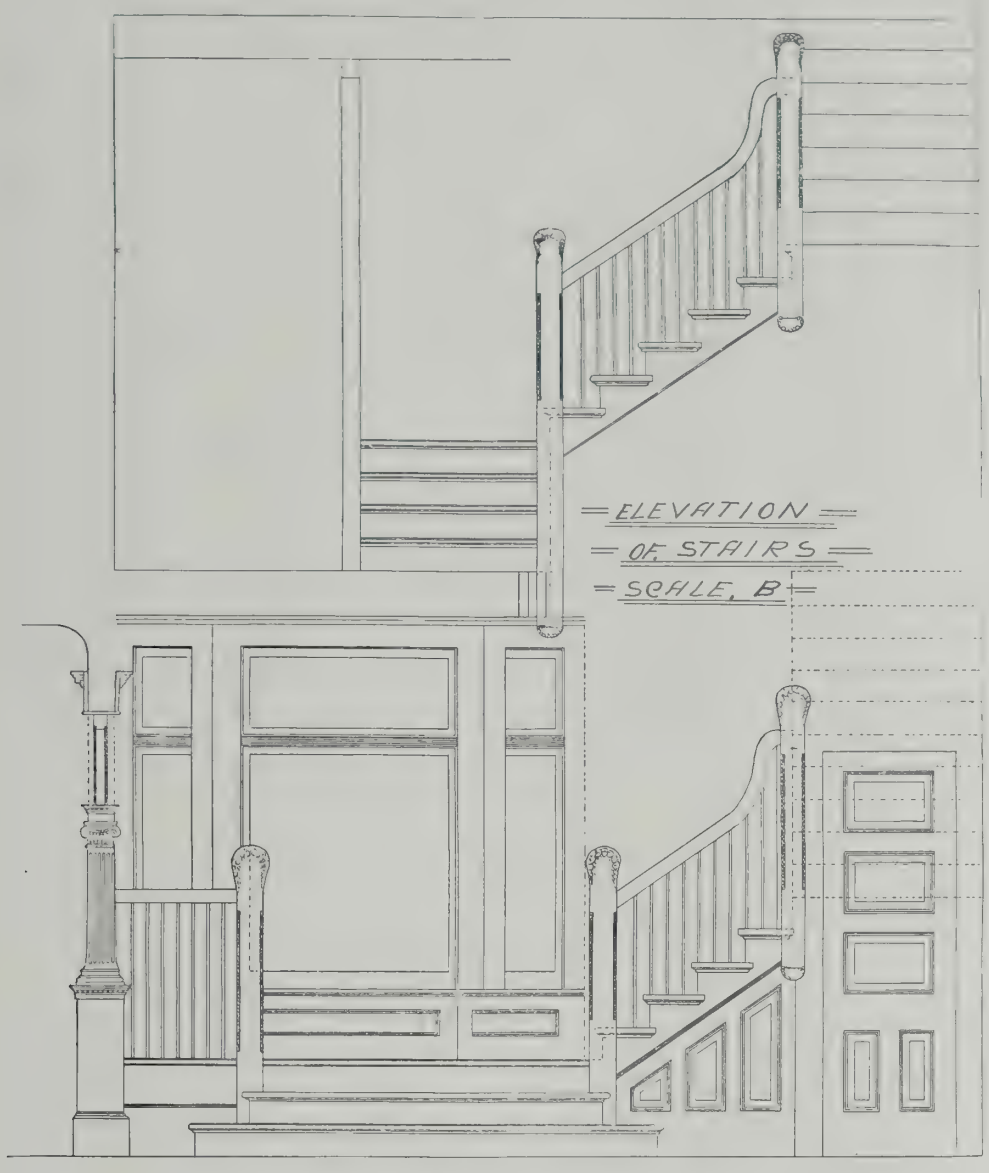


Fig. 1.

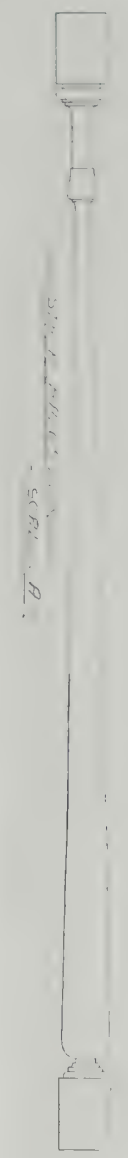


Fig. 2.

While we do not propose to go into the detail of stair-building, we will offer practical suggestions for use in stair construction and decorative work.

More has been written and published in relation to stair-building than in any other detailed feature of a house, for the simple reason that it is the most difficult problem for an architect to solve in the planning of a house in regard to the erection of a perfect stairway, and also for a builder to construct after the architect has prepared his detail drawings. It matters not how many detail drawings a builder may have, there will always be found a difference to be met in the final work in contemplation, because, if a building is perfect and true, and is constructed according to plans, there is always a difference, and in all cases measurements should be made from the building itself, after the house has been plastered. Stairs should never be built in a house until after the plastering is finished, because, if this is done before the plasterers have finished their work, a staircase can be easily ruined with mortar stains, and warped out of shape from dampness, etc.

Therefore, in presenting these drawings and this article, it will be seen that it is only possible to present a few essentials and suggestions that are applied for all stair-building.

In designing and planning a stairway, great consideration should be given for the comfort of the owner who is to occupy the house, rather than the architect, who wishes to create some effective architectural features, regardless of the necessary requirements.

The author of this article, who for many years has been an illustrator of moderate and expensive American homes, finds more mistakes and miscalculations in the building of a staircase than in any other part of the construction of a building, and it can be safely said that these errors occur not altogether among the young and inexperienced architects, but among the oldest of the school, and of the highest in the profession.

The staircase which we show in Fig. 1 presents an attractive stairway, with well-proportioned newel-posts of chaste design, with carved caps and neat balusters (Fig. 2), and it is built with broad landings.

One of the greatest experiences in the building of a staircase is the height of a riser, which should not be over 7 inches in height to insure a perfect rise, but this can be stretched to 7⅛ or 7¼ inches or 7½ inches, which can be called comfortable; anything over this should be avoided. In many cases this rule has been violated, and risers from 8 to 9 inches are to be found in expensive residences. In cases of this kind it would be much better to have sacrificed a part of a building rather than that of a staircase, because a house that is not comfortable is not livable.

A 10-inch tread should be used to insure a convenient step.

Landings on stairways are always found convenient, attractive, and create an opportunity for an artistic effect in the designing of a hall; winders in a staircase should always be avoided wherever it is possible to do so.

All stairs should be built of good quality of stock, and well supported on plank strings, with risers and treads well housed in to wall-string. All treads and risers should be planed and tongued together, as shown in Fig. 3, with blocks glued in behind. All treads and risers to be wedged with glued wedges.

Another important feature in a staircase is a hand-rail, which should be made with a good oval curve, as per Fig. 4, so that a good grasp can be obtained. Many a handrail is useless owing to the fact that it has been made without any thought of the purpose for which it is intended, and it is often found absolutely of no consequence or aid in going up or down a staircase. This is one of the most fatal mistakes to be made in the construction of a staircase, a mistake that is unfortunately found in many high-class houses. The object of an architect in designing a staircase for a home of magnificent proportions, is that a great hall necessarily requires the erection of a grand staircase, broad and massive, to keep it in harmony with the dimensions of the hall in which it is to be built, and consequently a small hand-rail suitable for one to secure a good grip on would be out of proportion to the balusters and newels required in a staircase of this character; and in carrying out this scheme of massiveness the usefulness of a hand-rail is entirely lost, but if a designer of a stairway is thoughtful he can create a hand-rail which will be useful, and at the same time present the harmonious and massive effect sought.

In building a staircase ample head-room should be maintained, especially when the stairs to third floor rise

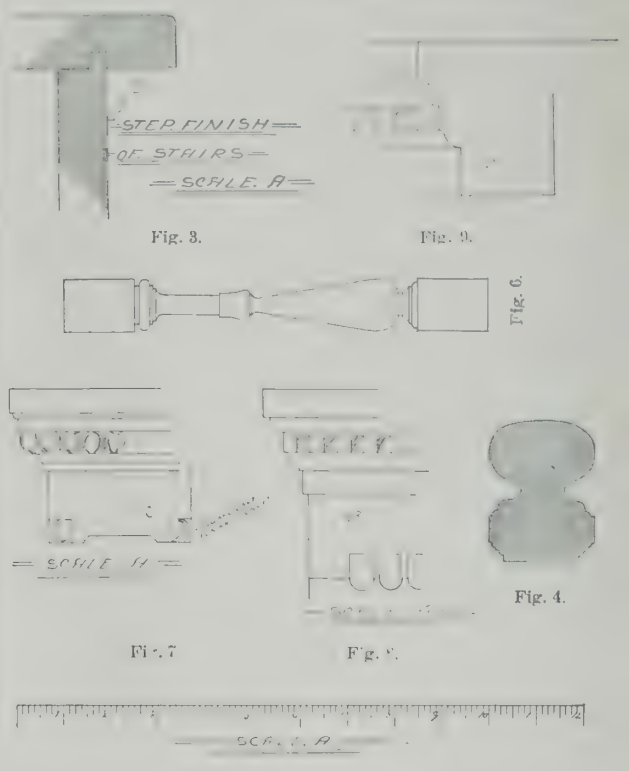


Fig. 3. Fig. 9. Fig. 6. Fig. 4. Fig. 7 Fig. 8.

up over the main stairway. This is a very important feature and special attention should be given it. The effect in descending a stairway with the fear of striking overhead, or of a stairway falling upon one, is not the pleasing and attractive result desired.

The Fig. 5 presents a detail for an archway between hall and parlor, which is very artistically executed in the Colonial style of architecture, with paneled and spindle base, from which rise columns with Ionic capitals, supporting frieze, which is handsomely paneled and carved, and from which springs the arch, which is also carved and decorated with Colonial wreaths.

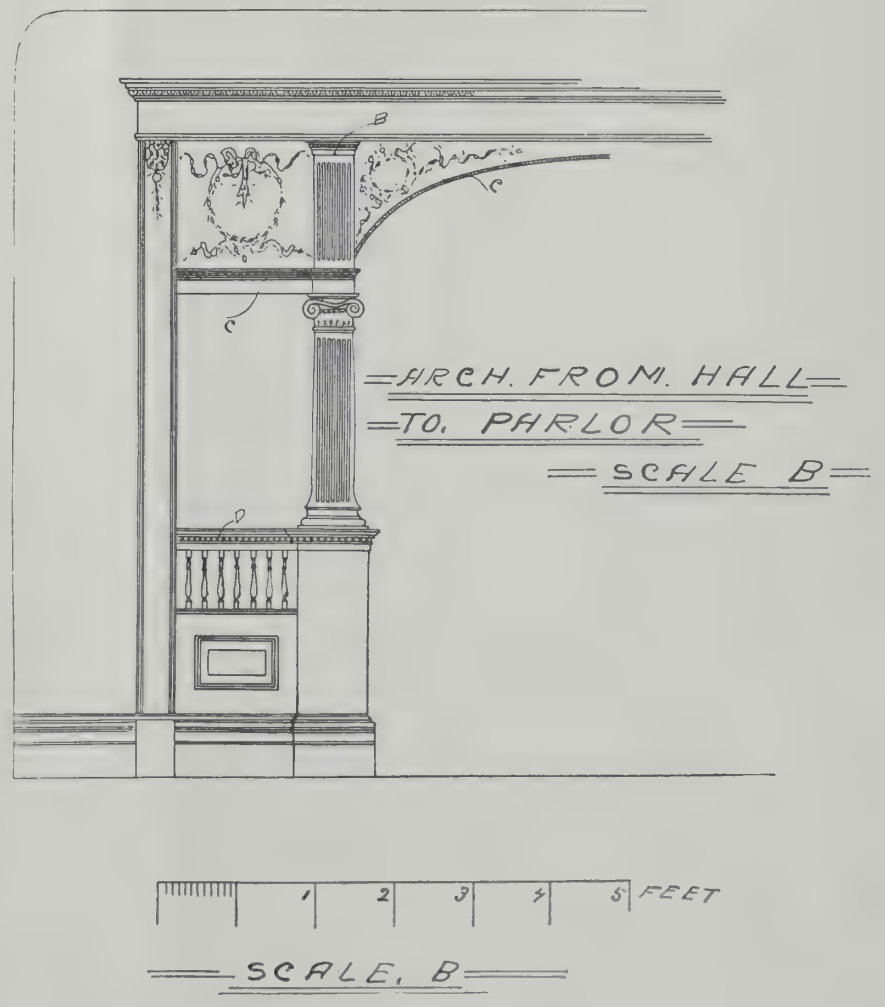


Fig. 5.

Fig. 6 shows a detail of the baluster which is built in base, while Fig. 7 shows an egg and dart detail for arch.

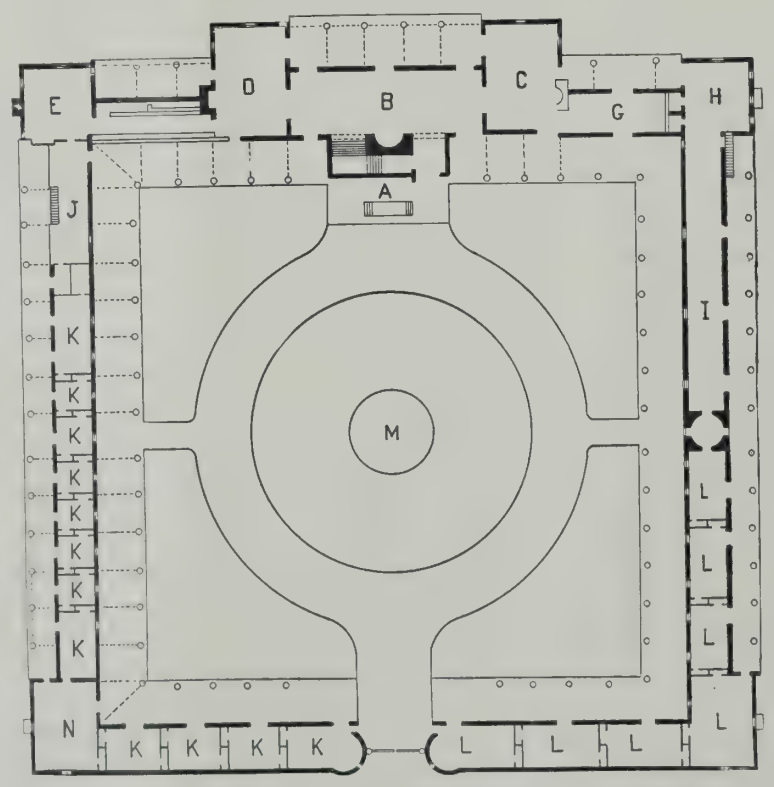
Figs. 8 and 9 present details of moldings at base and top, which pass across the elevation under and over the level of columns.

MUSIC ROOM—EAST END. THE HEARST COUNTRY SEAT IN PLEASANTON, CAL.

THE HEARST COUNTRY SEAT IN PLEASANTON, CAL.

THE engravings on pages 8, 9, and above illustrate the famous country seat, at Pleasanton, California, of Mrs. Phœbe A. Hearst, who is widely known as the originator and patron of the late international architectural contest in which Mr. Bénard, the French architect, won against a field of professional magnates, composed of representatives from the most celebrated schools of the time. Pleasanton is situated in the Livermore Valley, at the entrance to Niles Canyon, not far distant from the Bay of San Francisco, whose cool breezes moderate the temperature in a sensible degree. It is a valley celebrated for the exuberance of its agricultural productions, grapes, oranges, and all the fruits of warmer climates growing prolifically. Assisted nature responds to every effort made to beautify and adorn. The valley cuts through the coast range and affords magnificent sites for country homes. The quietness and retirement of the rurally inclined are here attained. The metropolis is only a score of miles distant and is easily accessible. Upon a plateau at the base of the foothills is the "Hacienda del Pozo de Verona," or the "House of the Well of Verona," a name recalling some agreeable reminiscences of Italian travel or scenery, a site commanding a widely diverse prospect, and surrounded by thousands of acres of vineyards and fruit orchards. The mountains arise on every side, allowing an entrance through a deep and precipitous canyon. Overlooking this is the "hacienda," built in the ancient style of Mexican rural dwellings, an enlarged adobe. The exterior is plain, rising to three stories at the ends and depressed to two stories in the center building. The exterior is almost without ornament. The roof is covered with Spanish tiles, and long spouts, in the Mexican fashion, project far beyond. Two balconies extend along the central building, and form the most delightful accessory to the whole house, deep, cool, and retired, paved with bricks. The likeness to the Mexican dwellings is added to by the court at the rear. The whole outside of the structure is covered with cement. The walls are of extreme thickness. The general style of the "hacienda" is carried out in the interior arrangements and adornments. In all the rooms the ceilings are of great timbers. The entire mansion is furnished in munificent style, and contains hundreds of examples of aborigine and Mexican handiwork. As far as possible the intent of Mrs. Hearst, to make the residence outside and in as well a facsimile of a Mexican home of wealth and refinement, has been carefully fulfilled.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.



A—Porte-cochère. E—Kitchen. I—Bowling Alley. M—Fountain.
B—Hall. F—Butler's Pantry. J—Servants' Porch. N—Servants' Hall.
C—Library. G—Lobby. K—Servants' Apartments.
D—Dining-room. H—Billiards. L—Guest Apartments.

A MODERN DWELLING AT BENSONHURST, LONG ISLAND.

WE present on page 12, in this issue, a modern dwelling which has recently been erected for Walter Jones, Esq., at Bensonhurst, Long Island. This house is built of standard material by experienced and competent builders, and is substantial as well as artistic in its architecture. The lines of the building are well broken by numerous bay windows and a spacious piazza. The building is complete in every detail and is elegantly finished off in the interior. The underpinning is built of rock-faced stone, while the superstructure is of wood. The exterior framework is covered with sheathing and paper, and the first story is clapboarded and painted a creamish brown with ivory white trimmings; the second story is covered with shingles and stained a mahogany color. The roof is shingled also, and stained a dull moss green, with harmonious effect. Dimensions: Front, 38 ft.: side, 42 ft., not including piazza. Height of ceilings; Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The house is planned with a central hall containing an ornamental staircase, with newel-posts rising up to ceiling and supporting arch with transom. This staircase has also balusters, posts and rail. This hall is trimmed with oak, and it has a paneled wainscoting. The vestibule is trimmed with oak, is paneled, and provided with tiled floor. The library, adjoining hall, is trimmed with similar wood, and it has a beamed ceiling, paneled wainscoting, and it contains an open fireplace with Roman brick hearth and facings, and mantel with columns and mirror. The parlor is treated in white enamel, and is provided with fire-

place trimmed with white glazed tiles, and mantel of Colonial style. The dining-room is treated in oak, and it is provided with an attractive nook with seat, and an open fireplace fitted up with tiled hearth and facings, and mantel. China cabinets with leaded glass doors are built in on either side of fireplace. The butler's pantry and store pantries are fitted up complete. The kitchen is provided with all the best modern conveniences, including a Thatcher range. The second floor contains four bedrooms, large closets, and bathroom. The latter is wainscoted and furnished with Ronalds & Johnson porcelain fixtures, and exposed nickel-plated plumbing. The third floor contains three bedrooms and ample storage. A cemented cellar contains laundry, furnace, and the necessary apartments. The house is provided with a Smith steam boiler heater. The house has double floors, electric light, gas logs, electric bells, steam heat, etc. The tiles and fireplaces were furnished by W. Jackson, 246 Front Street, New York; the mantels by White, Potter & Page, New York. Mr. G. H. Magill, of Ocean Avenue, Bensonhurst, Long Island, was the builder. Mr. Walter Jones, architect, Benson Avenue and Bay 31st Street, Bensonhurst, Long Island.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN DWELLING AT SPRINGFIELD, MASS.

WE present herewith on page 10 in this issue a modern dwelling which has been erected for the Forest Park Heights Land Company at Springfield, Mass. The design is attractive and pleasing, and it is a combination of excellent exterior features and well-arranged plans. The underpinning is built of red brick laid in red mortar. The exterior above, of wood, is covered with sheathing, paper, and shingles, stained a dull soft brown color, while the trimmings are painted cream white. The roof is shingled and stained in harmony with the remainder of the building. Dimensions: Front, 41 ft. 8 in.; side, 30 ft. 10 in., not including piazza. Height of ceilings: Cellar, 7 feet; first story, 9 ft. 2 in.; second, 8 ft. 10 in.; third, 8 ft. 6 in. The entrance is through a vestibule, trimmed with quartered oak. The hall is trimmed with similar wood, and it contains an ornamental staircase turned out of same, with newel, posts, and balusters. The parlor is trimmed with whitewood, and is treated in white enamel. It contains an open fireplace with tiled facings and hearth and mantel. The library is trimmed with quartered oak, and it has a nook for bookcases which are built in, and a paneled wainscot. The dining-room is trimmed with quartered oak, and it is well lighted and conveniently connected with a well-fitted up butler's pantry. The kitchen and its apartments are trimmed and wainscoted with whitewood, and furnished with the usual fixtures complete. The second floor is trimmed with whitewood treated in white enamel, and it contains a large open hall, four bedrooms, closets, and bathroom, the latter wainscoted and furnished with porcelain-lined tub, other fixtures, and exposed nickel-plated plumbing The third floor contains two bedrooms and trunk-room. A cemented cellar contains furnace-room, laundry, and other necessary apartments. Iron columns are used instead of brick piers in cellar. Cost $5,000 complete. Mr. Louis Frank Newman and Carroll H. Pratt, architects, 21 Elm Street, Springfield, Mass.

Our engraving was made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN RESIDENCE AT UPPER MONTCLAIR, N. J.

WE present herewith on pages 14 and 15 in this issue a modern residence, which has been recently erected for Joseph Bardsley, Esq., at Upper Montclair, N. J. The design presented illustrates a residence of excellent proportions, good detail, and attractive features, including a spacious and well-shaded piazza, octagonal projections, and bay windows. The underpinning and abutments at piazza are built of rock-faced red sandstone. The outside walls of parlor are built of similar stone. Remainder of first story is built of wood, and painted a reddish brown color, with cream white trimmings. The second story is also covered with clapboards and painted similar. The carved panels and gable ends at piazza are painted a cream color. The roof is covered with shingles and painted red. Dimensions: Front, 43 ft.; side, 65 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The interior arrangement is most excellent, and the whole is finished off in a very handsome manner. The entrance is through a vestibule, which is paneled with oak, and provided with a tiled floor. The main hall is trimmed with quartered oak, and it has a paneled wainscoting, hardwood floor, and an ornamental staircase with broad landing, from which a bay window with paneled seat is thrown out. This staircase has very handsome carved newel posts and balusters. The fireplace is built of brick, with hearth and facings of tiles, and a handsome mantel. The parlor is separated from hall proper by a square arch, which is supported on very handsome fluted columns with carved Ionic capitals. This room is treated in china white, and it contains an open fireplace, furnished with white enamel tiling and a carved mantel with beveled plate mirror. The library is trimmed with cherry, and it contains bookcases built in and an open fireplace with tiled furnishings. The dining-room is treated in a very elaborate manner. It is trimmed with quartered oak, and it contains a buffet built in and furnished with carved panels. The fireplace has tiled facings and hearth, and mantel of oak with columns and polished panels. An attractive feature is the rear piazza, which is enclosed with glass and used both as a conservatory and breakfast room. The butler's pantry is provided with all the best conveniences, and the doors are fitted with the Bardsley spring hitch. The kitchen and its apartments are wainscoted, and furnished with all the best modern conveniences, including a Richardson & Boynton range. The second floor contains five bedrooms, large closets, and bathroom, the latter wainscoted and furnished with exposed plumbing, a Standard tub, and J. L. Mott's fixtures, all nickelp lated. Third floor contains servants' quarters and ample storage. A cemented cellar contains laundry, provided with Alberene wash-tubs, furnace, and other necessary apartments. The house is heated by the Bundy system, direct and indirect steam heat, made by the Griffin Iron Company, Jersey City. The contractors were as follows: J. M. Rodgers, Paterson, N. J., carpenter; Owen Feeney, Montclair, N. J., mason; W. H. Canfield, East Orange, painter; Fentzlaff & Wolf, of Montclair, N. J., plumber. Mr. Christopher Myers, architect, 361 Broadway, New York.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A DEAL COUNTRY CLUB COTTAGE AT DEAL BEACH, N. J.

THE engravings shown on page 11 in this issue illustrate another one of those most artistic, attractive, and unique cottages erected for the Deal Beach Club by the Atlantic Coast Land Company, at Deal Beach, N. J. The design is treated in the Spanish style of architecture, and has several excellent features, the most prominent being the garden on top of roof with arbor, which is an ideal spot to rest in in the warm days of summer. The house being built for summer uses, there is no cellar under building, consequently the building rests upon posts with stone footings. The exterior framework is sheathed and then clapboarded, and painted a yellow ocher color, with blinds painted a warm brown. The piazza arches and posts are plastered and tinted in harmony. The trim throughout the interior is mitered white pine, painted with white enamel. The doors and jambs are of cypress, finished in hard oil. The hall contains an ornamental staircase, with newels, balusters, and rail of dainty design. The living-room contains an open fireplace built of brick, with hearth and facings of same, and mantel of neat design. The bathroom is wainscoted, and the whole is treated in white enamel, and is furnished with porcelain fixtures and exposed nickel-plated plumbing. This floor contains also one large bedroom with closet. The second floor contains three well-fitted up bedrooms. Mr. William Gardner Massarene, architect, St. James Building, 1133 Broadway, New York.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT GREENSBORO, N. C.

THE engravings on page 6, in this issue, illustrate a residence recently erected for C. S. Watson, Esq., at Greensboro, N. C. The illustrations present an architecturally attractive house, and the interior arrangement is most complete. The underpinning is built of local granite of a soft gray color. The superstructure is of wood, and the exterior framework is covered with sheathing, paper, and clapboards. The second story of tower and gables are shingled and then treated with three coats of paint. The roof is shingled. Dimensions: Front, 44 ft.; side, 57 ft., exclusive of steps. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft. The front hall contains a very beautiful staircase built on the circular plan, and of quartered red oak, with handsome newels, posts, and balusters. The parlor, sitting-room, and dining-room are trimmed with red oak, and each room contains a bay window and an open fireplace, trimmed with tiled facings and hearth, and handsome mantels of excellent design. There is also a large pantry and kitchen, trimmed with pine, finished natural, and furnished with best modern conveniences. Besides the rooms already described on this floor, there is a large rear hall, containing rear stairs, and the bathroom, which is wainscoted and furnished with porcelain fixtures and exposed plumbing. The second floor contains four bedrooms and large closets. The third floor contains ample storage. A cemented cellar contains laundry, furnace, and other necessary apartments. Mr. Geo. W. Payne & Son, architects, Carthage, Ill.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

Ruskin's Influence on Architecture.

THE death of Mr. Ruskin can hardly be said, in one sense, to mark his removal from among us. For some time past he had been, so far as the general public is concerned, a voice of the past rather than of the present; he had said his say to his generation in many volumes full of ardent thoughts expressed in ardent words; and the actual close of his life is an event which more immediately concerns those who were near to him and knew and loved him personally, than the general public of his readers, who had ceased to look for further utterances from him.

Even to these latter, however, the news of the final extinction of such a life—a life passed entirely in passionate aspiration after all that seemed to him to be beautiful, noble and true, and in the endeavor, not certainly without success, to awaken the same aspiration in others—must be occasion for some sympathetic reflection on the real meaning of such a phenomenon (for it is nothing less than phenomenal) as the presence, in this business-like, calculating, scientific century, of a writer like Ruskin. What was it really that he wanted? What was it that he accomplished?

What it was that he really wanted it would perhaps be rather difficult to say, and he might have found it difficult to define it himself. It might be best summed up, perhaps, by saying that he wanted to see more beauty in modern life; not only artistic but moral beauty. His many-colored aspirations, often apparently contradictory in detail, might all be translated into that general term. Often, indeed, and more especially in regard to modern social life, his persuasion that something (or everything) was wrong was a great deal clearer and more decisive than his proposals for putting it right. And in his often fierce denunciation of the characteristic uglinesses, material and social, of the nineteenth century, he entirely failed to see that it has some characteristic advantages also. His was not a robust nature; there was something feminine about his intellect, both in his intensity of feeling and in his inconsistency and his inability to see both sides of a question. He could see, for instance, what most of us can see, that railways have to some extent spoiled the character and the quiet of rural scenery, and that in the process of making they always bring ugliness temporarily at least into the landscape (the permanent disfigurement of the country by railways we hold to have been much exaggerated, by others besides Ruskin). But he could not recognize the enormous advantages to human progress and education brought about by more rapid and cheaper traveling, any more than he could see the real grandeur and impressiveness of such a splendid creation of human genius as a locomotive engine. He dreamed a dream, and his dream was of a picturesque mediæval England, with people in picturesque costumes each expressive of his rank and calling, and processions of *rosiaires* with their happy bridegrooms; and he could not see that he was wanting what is as impossible as for a grown-up man to be content with the garments and the playthings of his childhood. The child is often, no doubt, much more attractive than the man, and much more innocent; but the work of the world has to be carried on by men; and the century can no more go back to childhood than the individual.

It would be easy to show how, amid all this Utopianism, he is constantly flashing upon us sudden lights in regard to nobility of aim in life, the realization of which is quite independent of the social customs of one age or another; as in the passage (we forget at the moment in which of his works) in which he asks woman to contrast the beauty and sacredness of motherhood with the empty pleasure of fine dressing or "precedence," or that in which he symbolizes the best ideal of a man's life in the pregnant remark that a man should desire to be captain of a man-of-war, because it is a glorious task to conduct or manœuvre such a vessel, not because he covets the rank and title of "Captain." One might adduce instance after instance of this kind of enunciation of noble principles of life, often the more striking from the unexpected manner in which they crop up, sometimes in no apparent connection with the immediate subject. But our concern is more especially with the question, What did Ruskin do for art, and for the art of architecture more particularly?

And the answer is, that he made numbers of readers feel its interest and importance in a way they had never felt it before. Ruskin, let it be said most emphatically, is no guide and no critic in art, least of all in architecture. He does not really appear to have had any fixed principles in regard to art; his only principle was that of saying the most effective and picturesque things that occurred to him at the moment. He is not a writer to go to for "information" about architecture, as many amateurs fondly imagine. The "Stones of Venice" is, as far as the facts about architecture are concerned—whether about architecture generally or that of Venice in particular—a perfect medley of inaccuracies, contradictions, and exaggerations. The "Lectures on Architecture" is one of the most mischievously misleading books ever written on the subject. The "Seven Lamps" is full of fallacies, some of them thrown overboard by the author himself in curt characteristic foot-notes to

the later edition. But he was the first English writer on art who has had literary genius enough to make himself widely read for his mere style and eloquence, and to reach masses of persons who had never read a book upon art before, and never would but for him. Many of these, no doubt, are entirely deceived as to the value of Ruskin's critical utterances; they accept his rhetoric as argument, his fallacies as facts; and much which is new to them they think must be new to every one else. But Ruskin has made them care about it; and that, if it is not everything, is at least much, and has not been without a wide influence for good on the present generation.

And the influence which Ruskin has had for good upon architects, and may still have, is of the same nature. He has taught us nothing, indeed, in one sense. The Vice-President of the Institute of Architects, in his remarks from the chair at the meeting recently, implied that we owed to Ruskin the perception of the necessary relation between the plan and structure of a building and its exterior design. We do not think Ruskin ever took so logical a view of architecture as that would imply; we should be more inclined to trace it to Pugin; it dates from before Ruskin's advent on the scene. But though he teaches us nothing, he arouses our enthusiasm. It may be said of him as Wordsworth said of his "Solitary"—

"He had received
From Nature an intense and glowing mind."

There is perhaps hardly an "aphorism" or a principle laid down in the "Seven Lamps of Architecture" which might not be open to question; there is no information in it which can assist an architect in carrying out his work. But no one possessed of feeling and imagination can turn over its pages without feeling his enthusiasm stimulated, his ideas of the possible glory and greatness of architecture quickened and intensified, his perception of the essential qualities of great architecture extended. He must beware indeed of being taken in by the false rhetoric of some passages, such as the futile idea that "the addition of an unnecessary feature, such as a cable molding," transforms a plain structure like a bastion into architecture; a dictum which might be the parent of a whole tribe of false conclusions. It is in details of analysis that Ruskin goes wrong, and even condemns himself over and over again; it is in general exhortation that his power lies. "All old work nearly has been hard work. It may be the hard work of children, of barbarians, of rustics; but it is always their utmost. Ours has always the look of money's worth, of a stopping short wherever and whenever we can." Could there be a more telling statement of the difference we constantly feel between ancient and modern architecture? The remark on the use of metal in architecture, that it may be used "as a cement but not as a support," is a fine summary of the instinctive feeling one has as to the unmonumental quality of iron and steel construction. "I believe no cause to have been more active in the degradation of our national feeling for beauty than the constant use of cast-iron ornament." The mere form of statement, in a literary sense, is sometimes such as to make us perceive a thing in a new light; as in his description of the change from mere perforated windows (geometrical tracery) to flowing tracery. "Up to the last expansion of the penetrations the stonework was considered, as it actually is, *stiff*, and unyielding. . . . At the close of that period of pause, the first sign of the serious change was like a low breeze, passing through the emaciated tracery and making it tremble. It began to undulate like the threads of a cobweb lifted by the wind. It lost its essence as a structure of stone." Further on, what an eloquent plea for the glory of breadth and mass in architecture—

"As regards abstract power and awfulness, there is no question; without breadth of surface it is in vain to seek them; and it matters little, so that the surface be wide, bold and unbroken, whether it be of brick or of jasper; the light of heaven upon it, and the weight of earth in it, are all we need; for it is singular how forgetful the mind may become both of material and workmanship, if only it have space enough over which to range, and to remind it, however feebly, of the joy that it has in contemplating the flatness and sweep of great plains and broad seas."

Who could get to work to design in a small and niggling manner after letting such a sentence as that sink into him? This reference of architecture to the analogies of nature is at the bottom of a great deal of Ruskin's magic; he seems to say, "You have all around you great things in nature: will you be content to build little ones?"

"Among the first habits that a young architect should learn is that of thinking in shadow, not looking at a design in its miserable liny skeleton, but conceiving it as it will be when the dawn lights it and the dusk leaves it; when its stones will be hot and its crannies cool; when the lizards will bask on the one and the birds live in the other. Let him design with the sense of cold and heat upon him; let him cut out the shadows, as men dig wells in unwatered plains; and lead along the lights, as a founder does his hot metal; let him keep full command of both, and see that he knows how they fall and where they fade. His paper lines and proportions are of no value" [a query may be put to that, however]: "all that he has to do must be done by spaces of light and darkness; and his business is to see that the one is broad and bold enough not to be swallowed up by twilight, and the other deep enough not to be dried up like a shallow pool by a noon-day sun."

It is in passages like these that we feel Ruskin's influence on architecture; the way in which he raises and glorifies it, and treats it as something akin, or which may be so, to the breadth and beauty of nature itself. "Until that street architecture of ours is bettered, until we give it some size and boldness, until we give our windows recess and our walls thickness, I know not how we can blame our architects for their feebleness in more important work; their eyes are inured to narrowness and slightness; can we expect them at a word to conceive and deal with breadth and solidity?" "An architect should live as little in cities as a painter. Send him to our hills, and let him study there what nature understands by a buttress, and what by a dome." This last sentence is, we fear, a rhetorical fallacy; it ignores the fact that architecture is a shaping power, and nature, in the same sense, is not; but it is a rhetoric that at least feeds the fancy and imagination.

This is the real power which Ruskin has exercised in regard to art. He has, as far as words could do it, inspired us, and that is what we have mainly to thank him for. His reasoning is constantly wrong and contradictory, his facts incorrect, his analysis misleading; but his enthusiasm is always right, and his expression of it always, in Wordsworth's phrase, "intense and glowing," for of his literary genius it would be impossible to say too much. Among writers on art he is, in this respect, first—and the rest nowhere. He never writes a sentence which does not seem to bear his signature, not at the end, but all through it. What has been said of Beethoven as a composer may be said of Ruskin as a writer—he never has any "filling-in" passages; everything is at a glow of earnestness. In this respect his collected writings form one of the most remarkable literary phenomena of modern times. Their wonderful variety of interest, their sweep of metaphor and illustration, the manner in which at the least hint he turns aside for a moment to fling out winged words on some extraneous subject suggested by the one he is dealing with—all this furnishes a kind of intellectual spectacle of ever-changing color and vivacity which is quite extraordinary. It is curious, too, to note how, in the later editions of his works, he himself seems to stand apart and contemplate the spectacle from his later point of view—as much interested in his own writings as any of his readers can be. We do not think this can be called vanity; it is intensity of feeling. Everything in life and nature interested him, himself included. No more eloquent counterblast to the wretched gospel of *nil admirari* was ever put forth. He may not have guided our intellects much—he has unquestionably misguided them in some instances, or would have done so if he had been listened to. But he has fired our hearts and feelings as no other writers except great poets have done. He was, in fact, a great prose-poet, taking for his subject the beauty of art and of nature; and perhaps it is in that light that he will principally be regarded by after ages.—The Builder.

THE "LEADER" FURNACE.

THE Leader furnace, made by the Hess Warming and Ventilating Co., of 135 La Salle St., Chicago, Ill., is composed of soft steel plates, riveted at every joint, so that leakage of gas and dust and breakage of parts are impossible.

The heater is made so simply that any handy man can put it together, and the company furnishes, when desired, the complete equipment of pipes, registers, etc., all made to measurements, every part marked, with plan for erecting. The company aims to deal direct with the builder or house owner, saving middlemen's profits to the buyer.

Among recent sales of the Leader heaters was one contract to furnish and place the entire equipment in sixty-three houses of the Pullman Palace Car Company, in their model town of Pullman, removing therefrom the steam-heating apparatus, which contract was carried out during the past winter to the complete satisfaction of all concerned. This remarkable contract was fulfilled during winter weather, involving the placing of partition pipes and registers, building brick flues, air-ducts, etc. The work was performed without depriving any tenant of heat, even for a day.

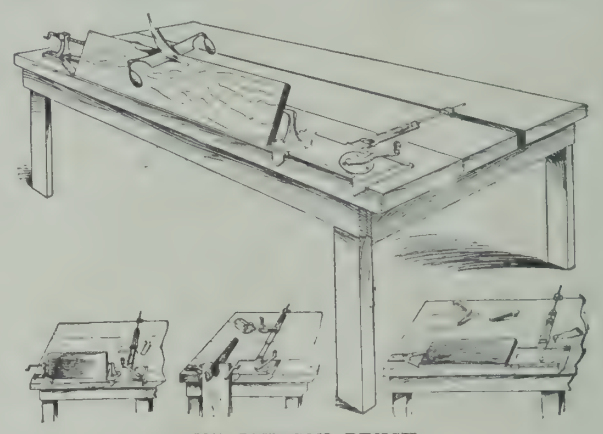
"LEADER" FURNACE.

Dark Houses.

PEOPLE who keep their houses dark for fear of the sunlight spoiling their carpets and furniture have no idea of the disease-destroying influence of sunlight and air. Recent experiments made have shown that bacilli exposed to the sun and air were destroyed in two hours, while those exposed to the sun, the air being excluded, were alive after fifty hours of exposure. A Neapolitan doctor has made an interesting experiment with cholera bacilli. While he found those protected from the sun killed guinea pigs in eighteen hours, as usual, those exposed to the sun were rendered harmless. As to the influence of sun and air on bacilli, it was ascertained that the oxygen of the air had a marked effect in assisting the sun's rays, and that the bacteria suffered more from the sun's rays if the supply of oxygen was increased than if it was diminished.

A USEFUL CARPENTER-BENCH APPLIANCE.

THE new bench device shown in the cut meets the needs of capenters and joiners by enabling them to hold work securely and in a convenient position.



THE JOHNSON BENCH.

It is especially useful where it is necessary to improvise a temporary work-bench from odd material that may be at hand. It saves the transportation of a heavy work-bench for each job of work. It is readily applied to any plank or bench, one foot or more in width, serving as a vise, and also to hold the timber in any desired position. It will accommodate long lengths of timber and any thickness down to ¼ inch, and even less, with little trouble. It also serves as a temporary saw-filing clamp. When not in use, the tool occupies a small space, being neatly boxed so as to be kept in the tool-chest. Manufactured of boiler-plate steel and malleable iron heavily tinned, all rust is avoided. By those doing outside job-work this tool will be appreciated, and it will also find good service in any woodworking shop. The manufacturers are Johnson Bench Tool Company, Escanaba, Mich.

"MODERN HOUSE HEATING" is the title of an admirable catalogue, published by the Gorton & Lidgerwood Company, of 96 Liberty Street, Manhattan, New York city. The catalogue is printed in two colors, and contains excellent illustrations and descriptions of the Gorton side-feed boilers for steam and hot-water heating.

"Aquarine."

FROM Muzzy Brothers, of 189–191 Main Street, Paterson, N. J., we have received sample of "Aquarine," a waterproof paint which seems to possess all the merits claimed for it by its manufacturers. "Aquarine" is a substitute for oil-paint at one-half the cost. It is used for whitening walls and ceilings in factories, docks, stables, and storehouses. It will not rub or scale off, and will check any fire. "Aquarine" is furnished in powder form in white and in colors. It is affected neither by weather nor gases, mixes readily with cold water, and produces a hard finish. Samples will be sent on application.

ARTISTIC GREENHOUSES.

THAT it is possible to attain grace and beauty in the construction of greenhouses has been proven more than once by Messieurs Lord & Burnham, horticultural architects and builders, steam and hot-water heating engineers, manufacturers of heaters, fittings, and patent

A GREENHOUSE AT FLATBUSH, BROOKLYN, N. Y.

apparatus for heating and ventilation. At the Columbian Exposition the firm received the five highest awards for conservatories, rose-houses, greenhouses, iron-framed plant-tables, beds, and ventilating machinery, as well as the highest award for heating apparatus.

The firm designs, manufactures, and builds complete, greenhouse structures of every kind, or furnishes material and plans so that the erection can be done by local mechanics. On receipt of information as to the size and style of the building wanted, its purposes, location it will occupy, general grade of grounds, etc., suitable plans are prepared gratis and submitted, together with descriptive specification of superstructure, heating, ventilation, plant-tables, etc., and estimate of the cost. In many cases it is found desirable and necessary to inspect the location the structure will occupy, and to confer with the owner, so that the most advantageous plans may be adopted. When desired the firm will arrange to have a competent representative call for this purpose. On acceptance of the preliminary plans, specifications, and estimates, detail working plans are perfected and the materials made ready. If a finished structure has been ordered, workmen are sent after the shipment of the material to complete the erection in every detail, leaving the house ready for planting.

A very handsomely illustrated catalogue is published, which can be obtained by writing to the firm at the St. James Building, Broadway and Twenty-sixth Street, Manhattan, New York city.

The Inspection of Lumber.

SAGINAW INSPECTION.

"FIRST CLEAR" is not less than 8 inches in width and is free from all imperfections, the term "Clear" implying freedom from defects.

"Second Clear" is not less than 8 inches in width, at which it must be so nearly perfect as to fall but a trifle short of first clear. As the width increases a larger range of defects may be allowed, so that at 12 inches wide a piece may have two knots of 1 inch diameter, or two narrow saps on one side; at 16 inches wide, especially if the piece is more than 1 inch thick, two knots may be allowed, or one knot and one sap not to exceed 1½ inches wide. At 20 inches wide the two knots may be larger or saps increase in width.

"Third Clear" is supposed to admit of three defects, but up to 10 inches knots should not exceed ¾ inch in diameter, or the sap should not exceed ¾ inch on one side. With increasing width knots may increase to three in number, not over 1 inch each, or sap equal to 1½ inches in width. As a rule the three first grades demand one perfect face. In the Saginaw and some other markets the term "Good" is used in designating the three upper grades, and purchases are sometimes made in "Good," "Select," "Fine Common." "Common" and "Culls," but unless these terms are specified the quality "Good" in common use will include not only the three upper grades, but also the next grade below, or "Selects."

SELECTS.

"Selects" is a term which will allow four defects in a piece of lumber: Four knots not over 1 inch in diameter, according to the size of the piece, or two saps on one side, which in pieces 12 inches wide should not exceed 3 inches in the aggregate or include more than one-quarter the sap side, the heart side being the face. With increasing width the proportion of sap may increase, or with narrow saps the face side may have some knots. The general description of this grade, however, is of a class of lumber which has defects of such a character as to condemn it for the three uppers, yet suitable for many uses to which the three uppers may be put.

"Fine Common," sometimes known as "Select Common" or "Select Box," or merely "Box," is a grade of lumber suitable for finishing purposes, yet having too much sap on one side or too many knots on the other to admit of its being classed in the grade of "Selects."

"Fine Common" is usually cut from the outside of the log, sometimes known as sap boards, the general character of which is to give one face side while the other is largely covered with sap, which if properly piled to dry without mold is adapted to a large proportion of the finer work where only one side is exposed to view. With this point in mind the inspector will allow knots in this grade proportioned to the size of the piece. If the sap is narrow the face may have one or two small knots, but, except in wide lumber, the rule is observed, "One side a face." Pieces below 8 inches in width are seldom accepted in this grade, and at that width the defect is in sap, which may embrace not more than one-third the sap side and must not run out to the face side; or a board of that width may have a good sap side nearly, if not wholly, clear of knots and with two small knots on the heart side.

In larger pieces a board or plank having too many defects for the grade of "Selects" and yet approaching almost to the requirements of the grade is included in the "Fine Common." A board 16 inches wide, 1 inch thick, with five knots not to exceed 5 inches in diameter and having no other defects, would be classed as "Fine Common." The same piece if 1½ or 2 inches thick would likely be classed as "Selects" by most inspectors. Shaky lumber is not admitted in this or the upper grades.

STRIPS.

"Strips First Clear" are 6 inches wide, 1 inch thick, free from all imperfections, and are known as clapboard or siding strips. The term "siding strips" should not be confounded with "sidings," lumber cut from one side of a log, in distinction from the stock or lumber cut from the square log.

"Strips Second Clear" are 6 inches wide and 1 inch thick, and may have two small sound knots, or if no knots the sap may equal 1 inch on one edge of one side.

"Strips Third Clear" are 6 inches wide and 1 inch thick, and may have three small sound knots, and on one side in addition sap equal to 2 inches in width.

All strips in these three grades must be free from rot, split or shake.

STRIPS, FLOORING AND FENCING.

These terms include all strips not as good as "Third Clear," yet free from rot or split. Flooring strips must be of full thickness and width, except where narrower width is desired, when they may be of the uniform width of 3, 4 or 5 inches. All knots in flooring strips must be sound. Fencing strips include all coarse grade strips not good enough for flooring and above the grade of culls, or strips not up to the standard thickness, and their inspection is less rigid than the other grades.

"Common."—This term includes all boards, plank, scantling, strips, joist, timber and lumber not otherwise

VIEW IN CONSERVATORY, FLATBUSH, BROOKLYN, N. Y.

defined which do not come up to the "Select Box" grade, but are of a generally sound character, well manufactured, of full thickness, and free from large loose knots and bad shakes. Scantling joists and timber must be free from knots or imperfections which would weaken the piece for substantial building purposes. Pieces containing worm-holes and small sap streaks which do not materially damage the piece for the uses in which it is usually employed belong to this grade. One straight split not more than one-quarter the length of the board may be allowed. No lumber under 10 feet in length is considered merchantable in this or the better grades.

SHIPPING CULLS.

Timber containing unsound knots which affect the strength of the piece, black or moldy sap, unsound hearts and badly sawed are included in this class. The pieces are available for coarse use, and all other lumber not up to the grade of "Common" is included in this grade. Anything poorer than "Shipping Culls" is not recognized in any market.

Saginaw lumber is always made in 12, 14 and 16 foot lengths (with an exceptional log of other lengths), in all grades, except dimension stuff, where lengths are cut to suit the sizes demanded, but the sidings from such logs are usually cut off to the 12, 14 and 16 foot standard. The thicknesses of Saginaw lumber as usually cut are 1, 1¾ and 2 inches, but with some 3-inch in coarse plank or in extra nice stock for thick upper or deals.—F. A. Hersh, in Carpentry and Building.

KINNEAR'S STEEL ROLLING DOORS, SHUTTERS, AND PARTITIONS.

THE great losses from fire sustained by insurance companies during the past two years have rudely awakened us to the great necessity of better fire protection for all buildings.

It is not only necessary to guard against fire from the interior of a building, but very essential to protect the building from adjoining structures occupied by careless tenants. Hence, it is necessary to have windows and doors so protected that a fire will be absolutely stopped and prevented from passing through any openings.

Hundreds of fire shutters and doors of various kinds have been built and applied in a haphazard manner, but the Kinnear steel rolling doors, shutters and partitions are among the few ever constructed on a practical and scientific principle.

The accompanying cut illustrates the Kinnear steel rolling shutters, applied on the windows of court or light-shaft on a large business block, and plainly indicates the danger from fire in the adjoining building. The shutters shown in cut are of the automatic construction, being always open except in case of fire, when they close instantly at 150 degrees of heat. The action is instantaneous and absolutely sure.

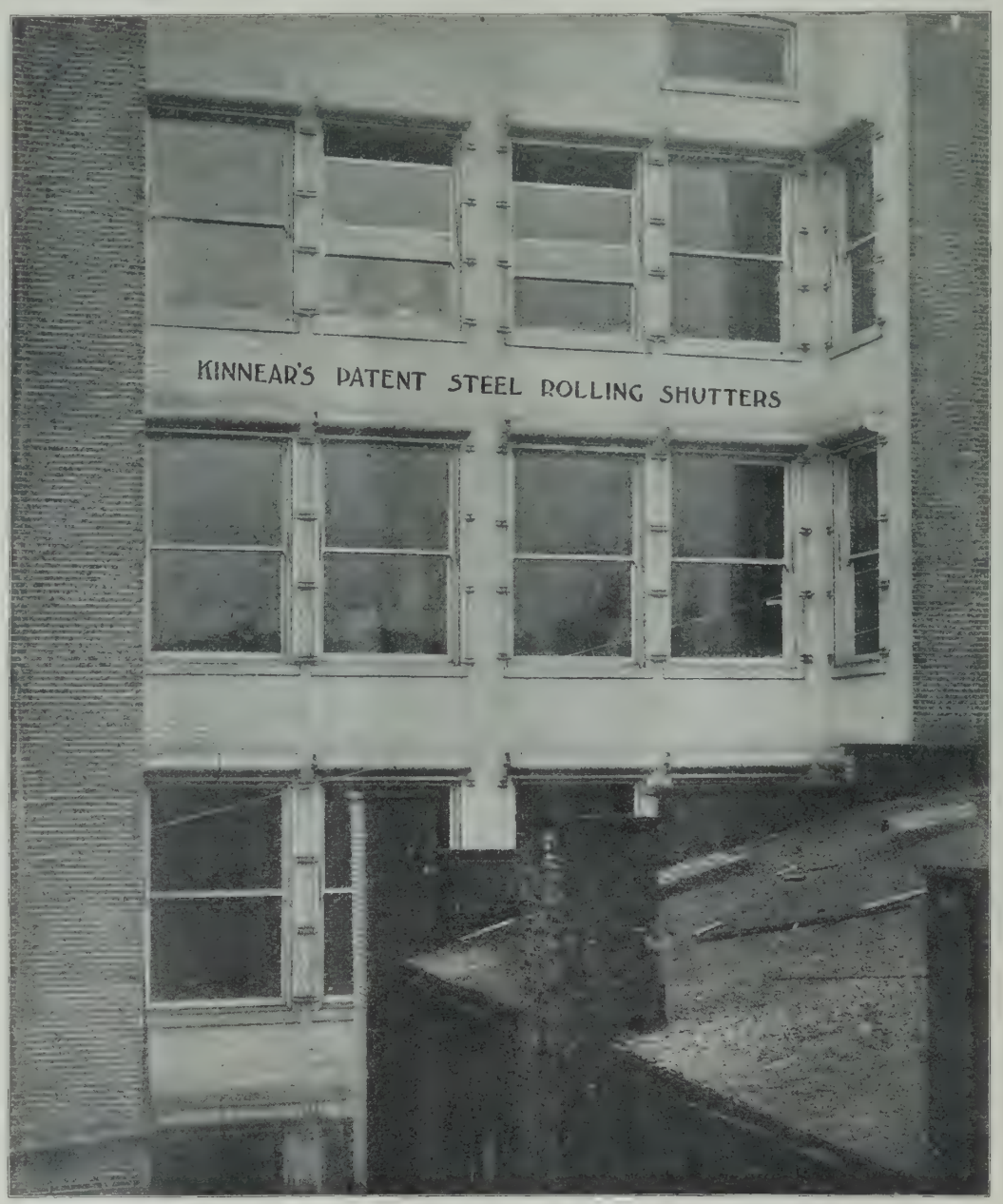
The shutters are manufactured by the Kinnear Manufacturing Company, of Columbus, Ohio.

The company also builds constructions for every possible purpose, or where a steel rolling door, shutter, or partition can be utilized.

Steel rolling doors for freight-houses, roundhouses, ocean piers, warehouses; rolling shutters for fire and burglar protection; rolling partitions for churches and school buildings, are among this company's products, and any one interested in these commodities should send for illustrated catalogue.

The company is shipping goods to every country on the globe, and, in spite of a greatly increased output (acquired since moving into their new and extensive buildings), its plant is being tested to its utmost capacity.

Offices or agencies are maintained in New York, Philadelphia, Boston, St. Louis, Chicago, Buffalo, Cleveland, Louisville, Pittsburg, Indianapolis, and New Orleans, where customers can depend on prompt and courteous attention to their requirements.

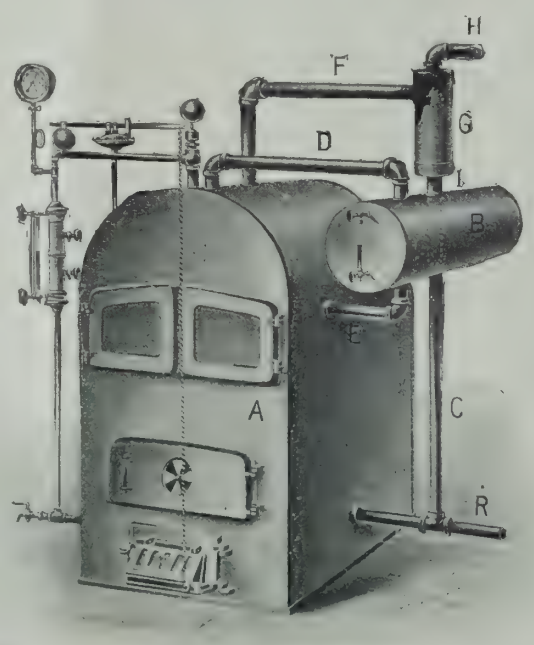


STEEL ROLLING SHUTTERS.

JACOBUS SAFETY WATER REGULATOR FOR STEAM BOILERS.

In heating boilers trouble is experienced by the water's being driven out of the boilers in starting up the fires. If an ordinary automatic feeding device is used, the water which returns from the heating system will sometimes flood the boiler. In addition to these difficulties the water is driven out of the boiler either suddenly or gradually through a priming action. The application of the Jacobus regulator, devised by M. R. Jacobus, 8 West Sixty-fourth Street, New York city, makes it impossible to drive the water from the boiler.

The regulator checks the action of priming by furnishing boiler with an abundant supply of feed-water at the instant it begins to prime. The regulator adjusts the water-level, preventing it from rising too high in the boiler as well as from falling too low, and in this respect it differs from all ordinary automatic feeding devices.



THE JACOBUS SAFETY REGULATOR.

The regulator may be attached to a boiler A of any form. A water supply and receiving vessel B is placed at such a height as to be about half full at the ordinary water-level of the boiler A. The capacity of this vessel is such as to supply the proper amount of water in case of a sudden diminution, as in starting up the fire, or from other causes which would affect the water-level of the boiler. The vessel B is connected at or near the bottom or lower portion, with the water-space of the boiler, by a suitable pipe C, connecting directly into the bottom of the boiler or with the return pipe R from the radiators. Steam is conducted from the steam space of the boiler by means of a suitable pipe D to the upper portion. This maintains the same steam pressure upon the water in the vessel B as upon the water in the boiler A, thus causing each to seek the same level. A suitable pipe connection E is made between the water space of the boiler A and water space of the vessel B for establishing a water circulation between water in the vessel B and the water in the boiler. The steam generated by the boiler passes through the pipe F into the separator G, and finally outward through the steam main H. The lower portion of the separator G is connected with the water supply and receiving vessel by means of a vertical pipe I, which extends near the bottom of said vessel so as to be below the water-level in the vessel. In consequence of this construction any water which may be carried from the boiler through the pipe F is deposited in the separator and passes into the supply and receiving vessel B, while substantially dry steam passes from the separator to the main steam pipe H, whence it is distributed to the radiators. The utility of the Jacobus safety water regulator has been proved by long-continued successful application where troubles were found to exist on account of the causes which have been specified, and in which all ordinary remedies and devices for removing the troubles were found to fail.

The water supply and receiving vessel, which is marked B in the cut, serves to remove water from the boiler in case an excessive quantity is returned from the heating system, as well as to supply water to the boiler when there is not a sufficient amount of water returned from the system, and thus removes the difficulty experienced when an ordinary automatic feeding device is used.

When the regulator is attached, the water which primes over with the steam will be deposited in the separator, marked G in the cut, and the water thrown from the steam will cause the water in the vessel B to flow rapidly into the boiler. In this way, not only is the water in the boiler maintained at a constant level, but the water which flows rapidly from the vessel B into the boiler checks the priming.

The object of employing the water circulating pipe E is to heat the water in the vessel B, on starting up the boiler, at the same rate as the water in the boiler.

THE Brunswick-Balke-Collender Co., of Chicago, is meeting with anticipated good success in marketing the Wickes system of refrigerators.

Shrewd business men do not grow enthusiastic over everything in the packing line that is brought to their notice, but there was unanimity of opinion among all packers when the Wickes system was explained and given a practical test. Aside from the ingenuity of the invention, the chief point of attraction in the Wickes system was the firm assurance that the immediate installation of the Wickes system into all refrigerator-cars and meat-houses would result in such a material saving of ice—nearly one-half—that in a very short time the cost of the change would be paid for in this saving of ice alone. At present Wickes' system of refrigerators is used in all cars and meat-houses belonging to Armour & Co., Nelson Morris & Co., Swift & Co., Libby, McNeill & Libby, and other packers. The Merchants' Dispatch has 10,000 in use.

The Wickes system of refrigerators for family use, as manufactured by the Brunswick-Balke-Collender Co., of Chicago, are in every particular practical miniatures of the larger ones successfully used by packers. They will just as readily pay for themselves in the saving of ice alone. As already stated, the Brunswick Co. alone manufacture or sell these refrigerators, made entirely under the Wickes system.

The Brunswick Co.'s Wickes system of refrigerators are made in all styles and sizes; they are porcelain-lined inside and out, insuring perfect cleanliness and absolute freedom from obnoxious odors, the common failing of all cheap refrigerators.

GOODFORM CLOSET SETS

Goodform Closet Sets.

Keep clothes shapely, closets orderly, and take only half the room you now use for the same garments. Money back if you want it.

Men's Sets, $3.00 each, express paid. Twelve garment yokes, 6 trousers hangers, 2 shelf bars, 1 loop.

Women's Sets, same price.

Two Sets, one shipment, $5.00.

If your dealer hasn't them, remit to us. Booklet free.

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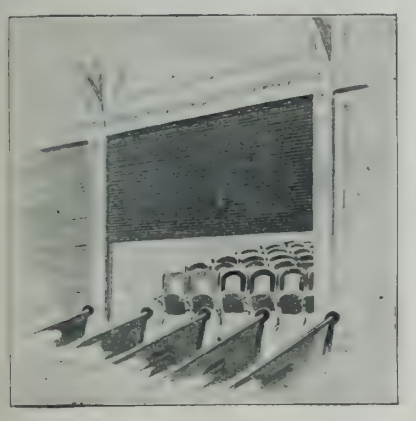

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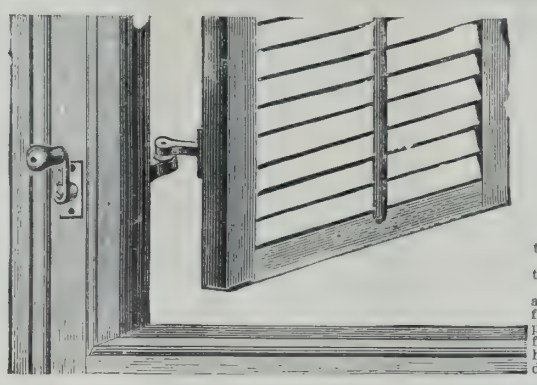

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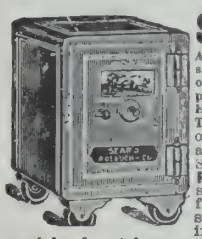

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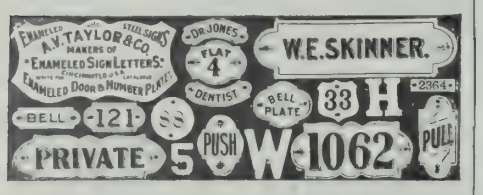

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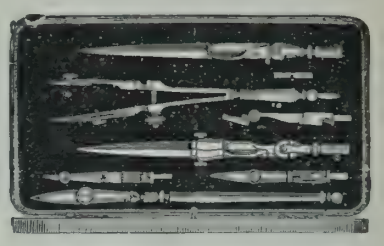

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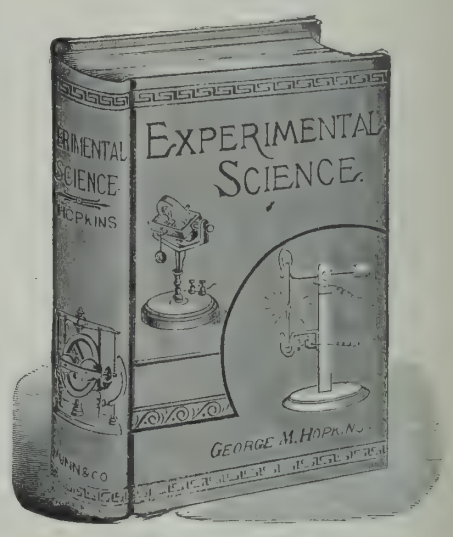

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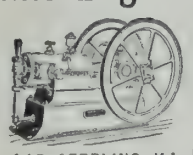

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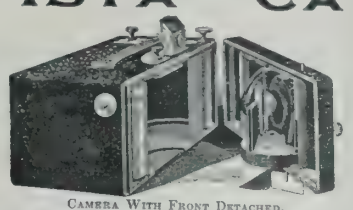

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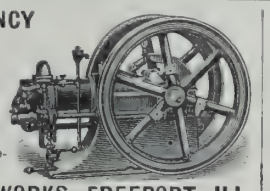

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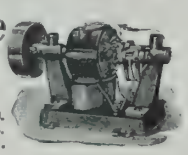

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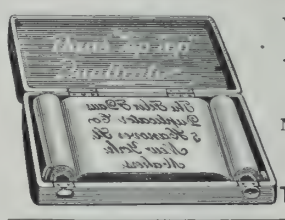

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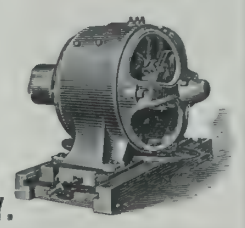

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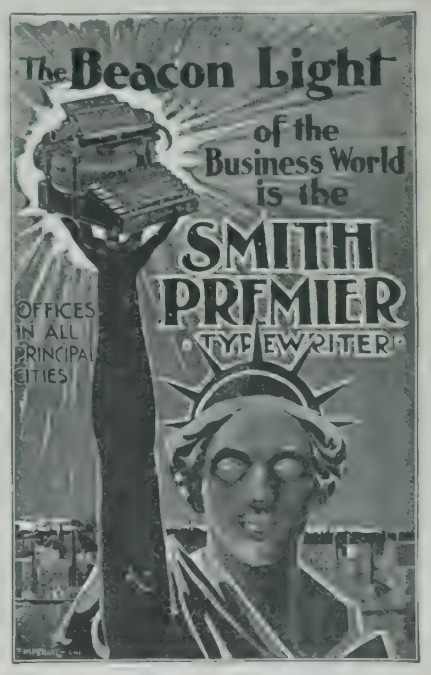

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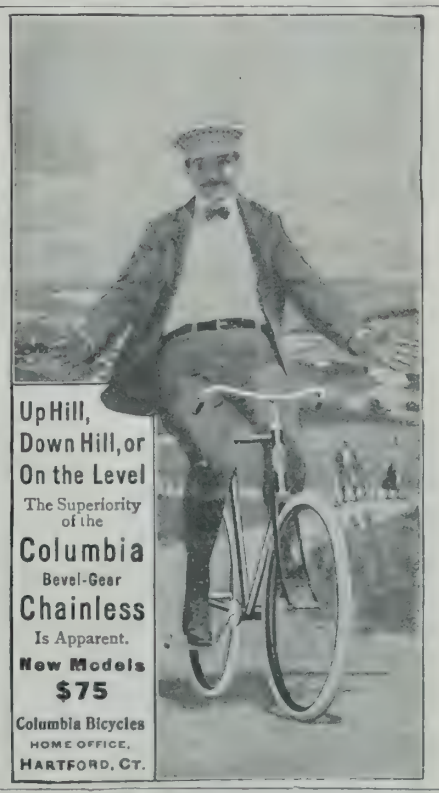

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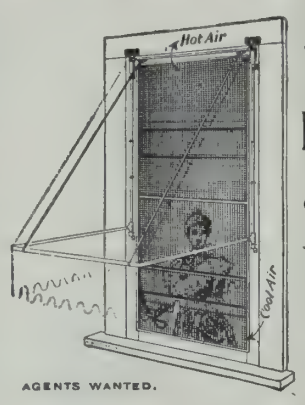

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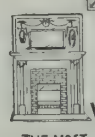

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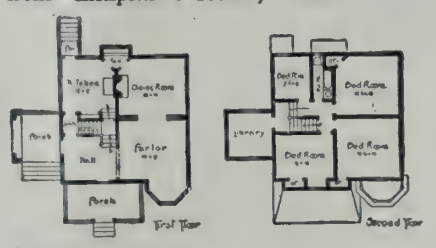

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THE PAVILION OF BELGIUM AT THE PARIS EXPOSITION.—See page 37.

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AMERICAN ARCHITECTURE AS OPPOSED TO ARCHITECTURE IN AMERICA.*

BY ERNEST FLAGG, OF NEW YORK.

AT no time since the Europeans first began to build in America has there been anything which might properly be called an American style of architecture. There have been American ways of building, as, for instance, our high buildings with the skeleton construction and the cast-iron fronts of thirty or forty years ago, but the decorative features have been used in accordance with passing fashions, supposedly modeled on European usage, with no such modification as would stamp them with what might be called an air of nationality, or else they have been extraordinary attempts by individuals at originality. None of these attempts have met with popular favor.

All the so-called "styles" of the past have been created by a slow system of evolution from what has gone before, accomplished by the combined effort of all the minds engaged, working along the same lines, each one contributing his infinitesimal share to the never-ending process—a process which is precisely similar to that which produces our fashions in dress. No one knows exactly who is responsible for the change, but we can see that change is always in progress; to the uninitiated it may not seem very apparent from year to year, but if we compare the fashions in dress at intervals of ten or fifteen years the change is striking enough for any one to distinguish. So it is in architecture, though, owing to the nature of the materials used, change occurs more slowly. If we study the history of architecture in Europe we shall find that from the tenth century all the great changes in style were simultaneously common to all the countries. Thus we find in practically all European countries at about the same epoch the styles which are classified in a general way as Romanesque, Gothic, Renaissance, Rococo, etc., but in each country or province, soon after their introduction they assume a distinctive local character. We also find that some one country is in advance of the others, and that every great change spreads rapidly from the place where it was first developed to all the other countries, but that the minor changes do not spread rapidly, and are confined generally to the different localities where they originate and go to make the local or national distinctions of the general style. It is natural that as communication becomes more rapid between different sections these local differences should disappear, and this is exactly what we find has happened. In France, for instance, during the Gothic epoch, we find distinct local characteristics in the different provinces; thus the Burgundian, Aquitanian, Touranian, those of the Isle de France, etc., while to-day the style is national, or, we may say, Parisian.

Now it seems not at all unlikely that the causes which have led to the breaking down of the barriers between the different provinces of one country will in future operate to break down the barriers between the different countries; that local characteristics will become less and less pronounced, and that even the minor changes in the fashion of building will tend to become more world-wide. This is exactly what has occurred in the fashions for dress. Local distinctions are rapidly passing away, and a dress that is fashionable to-day in Paris is also fashionable in New York, Berlin, Rome, St. Petersburg, London, and in every other civilized capital. If France leads in this respect, and the others follow, it must be because there is in the French mind a quality which fits it to lead in such matters, for the bondage of the other nations is entirely voluntary.

Owing to the peculiar situation of America and to the natural independence and lack of reverence of the American mind the course of architecture here has presented an anomaly in the development of style, and rules which apply elsewhere do not seem to apply here. Nevertheless it is very certain that the process of development which works everywhere else will in time be found working here; indeed, it becomes more evident daily that this process is already well under way. The foundation for any such development must necessarily begin with the schools. In every European country we find that before the young men begin to build they undergo a long process of training, either in schools or as apprentices, to fit them for the work. In the past we have thought such preparation unnecessary. Almost every young American, as soon as he is able to draw a straight line, has felt himself competent to undertake any work of architecture, and not only that, but he has found that most people have been ready to agree with him in this way of thinking. People having large sums to invest, if not willing to intrust them to him at the start, have been willing to do so after a few years, when he is supposed to have had the necessary experience. These methods still hold true in many places to-day. Physicians, engineers, lawyers, and other professional men must have been properly trained before they are employed; not so with architects. Most employers, indeed, feel that they are very good architects themselves, and few have any distinct notion of what constitutes an architectural training.

This is an entirely unnatural state of affairs, and no one who understands the American mind can believe that it will last. Indeed, there is, at the present time, every indication that it will not last. Schools of architecture multiply on every side—young men flock abroad to seek architectural training, and the results of this movement are already beginning to be apparent in our architecture. Fortunately, this force is a unifying one. I say fortunately, though I doubt if it could be otherwise. The great majority of our students are thinking and working in the same style, though this can by no means be said of our practicing architects. They are for the most part still borrowing from any epoch of antiquity or designing in a style of their own invention as the fancy seizes them. They deprecate what they call the "Frenchifying" of American architecture, as if there were any such thing as American architecture in the hodge-podge which we see about us.

In the meantime the French influence is slowly, but surely, predominating. Our young men go to Paris and become convinced of the wisdom of the French methods. From the great masters of the French school, under whose influence they are brought, they imbibe such logical, reasonable, and convincing instruction, that I do not believe it possible for a young man anxious to learn to come away unconvinced. The converts which these men make after their return among the young men who themselves are not able to go abroad are as ten to one.

A revolution is in full progress among us, and it is beginning just where it ought to begin—that is, with the students. Let no one mistake the introduction of what appears to be modern French architecture as only a passing fancy to go the way of the "Richardsonian Romanesque," "Queen Anne," and "Italian Renaissance." It is an entirely different affair. It means much more than appears on the surface. The French resemblance is only an incident; it may, indeed, soon pall and pass away, but the movement means that the principles which the French use are being introduced here, and these will last because they are founded on good taste, guided by common sense. Henceforth American architects are to be properly instructed before they enter upon their duties. American architecture is not to be "Frenchified," unless France can dominate the fashions of the world in building by her taste and skill, as she has dominated them in dress. The movement means that our architects of the future will apply to the art in this country the same logical reasoning, and that they will have the same careful preparation for the work that helps the Frenchman to lead the world in the fine arts. It also means that in the future the whole body of American architects are to work together along the same lines—to think in the same style. Thus we are about to enter upon a course which will make possible the evolution of a national style of our own, or perhaps enable us to set the fashion for the world.

*Paper read at the Second Annual Convention of the Architectural League of America, Chicago.

"INDIGENOUS AND INVENTIVE ARCHITECTURE" FOR AMERICA.*

BY ELMER GREY, OF MILWAUKEE.

ONE of the purposes of this organization, as expressed in your constitution, is "to encourage an indigenous and inventive architecture, and to lead architectural thought to modern sources of inspiration."

In commenting upon the manner in which such purpose shall be attained, in the hope that my point of view may not be without some value, I shall assume that the indigenous and inventive qualities in our architecture will, when obtained, appear in its style. Next I propose to indicate, as clearly as I am able to, the nature of this quality called style; and then I shall take up the words "indigenous" and "inventive" in their order and attempt to show how, in my opinion, we can best go about to attain to an "indigenous and inventive architecture" in America.

The nature of an architectural style is closely akin to the nature of the personal style of an individual. In the case of the individual it is, of course, the result of his continued endeavors to improve his character. In doing so he does not ape some one else, neither does he discard the example of heroic types that have lived before him, or who are living in his own time. He attempts to discover the laws which rule or rule such lives and endeavors to follow similar laws in arranging his own conduct. In much the same way is style in architecture evolved. We are not to copy past styles, neither are we to consider them useless as modern sources of inspiration. We are to try to discover the laws which governed their success, to discern how those laws should be modified to suit existing conditions, and then to apply them in the solution of our own problems. The result will be a beauty, the exact nature of which we may not be able to define, but, like the quality in a man of which he is unconscious, but which others feel to be his personal atmosphere or style, it will be all the more vital and all the more precious because defying analysis.

In attempting to discern the modifications to be made to the laws which governed the success of past styles we are to consider, first, our increased complexity of material requirements over those of past ages, as are brought about by an advanced social condition, and the means of satisfying such increased demands afforded us in improved methods of construction and in new forms of building materials. We are also to consider that, in all ages, artists have drawn upon the work of their predecessors in seeking for inspiration, and that we are particularly fortunate in having more of such precedent to draw from and in being provided, through the art of photography and through facilitated travel, with much readier means of access to it. These are some of the considerations which should be incorporated as modifications of the laws which governed the success of past styles and of the laws which we are to apply as aids in evolving a style of our own.

Now, how can we best go about to attain to an "indigenous architectural style" in America? What should be our sources of inspiration in aspiring to it? Are we, in seeking for them, to expect that they will appear only in things which refer to a building's external adornment? And even so, would we, in an appreciation of the beauty of all the architectural ornament of other times and of our many facilities for enjoying it, be likely to express such appreciation in our art did we reject as sources of inspiration all things not American? Surely not. The sources of inspiration for an indigenous style of American architecture are not thus limited. Style is *not* the external adornment of a building: it is the vital quality of it which has resulted from conditions inherent in its making, and which include situation, cost, material requirements, the constructional means available for meeting those requirements, and the ornament with which it was thought fitting to clothe it. And the modern sources of inspiration for an indigenous style of architecture in America lie in a perception of the possibilities of the sites of our structures; in a knowledge of the most advantageous method of disposing the money available for their erection; in the insight which shall discern the vital offices buildings should fulfil, and the manner in which they should fulfil them; in the familiarity with the building methods and building materials best adapted to accomplish such fulfilment; and finally, in *all* things which suggest the forms of ornament most fitting for the purpose of adorning our structures.

And now, how can we have an "inventive" architecture for America—that is, a new architecture; one that did not before exist; an architecture that shall be not only distinctively American in its style, but that shall also be new in its style? In an address before the Boston Architectural Club in October, 1893, Mr. Robert D. Andrews said: "I think it is the custom nowadays to put our conscious effort in the wrong place in the treatment of art. We put it at the end, when it ought to be at the beginning. We elaborate our superstructure, but treat the foundations as of little account." I believe that custom still prevails. The poets never tire of calling our attention toward the unity of life, toward the intimate relation all living things bear to one another, and toward the fact that this relation is a far more intimate one than we almost always feel it to be. Scientific research in all its ablest conclusions emphasizes the same point, insists upon the oneness of all nature and of all life; upon the fact that each plant in nature is not a self-dependent organism, but that its health and its life is governed by a force which controls and sustains all living things; upon the fact that a man is not an independent organism, but that, whether he is conscious of it or not, his fortunes are governed by a higher ambition

*Paper read before the Second Annual Convention of the Architectural League of America at Chicago.

than his own, and that, though he is given free will to choose between the good and the bad, his final destiny will rest upon obedience or disobedience to physical, moral and spiritual laws over which he has no control.

Now, art—that is, living art, true art, art that is not merely a thing of dead forms and formulæ—is one of the most potent expressions of human life. It is the conservation culminated in material form of all the artist has had of knowledge, of skill, of experience, of character; and it is subject to the same laws which govern life, and is a part of the same great unity; so that, by ascertaining how those laws operate in the production of new things, of inventive things in nature, or in life, we shall also see how they operate in the creation of new things in art. In nature we find that a plant produces in leaves, flowers and fruit only that which it has been able to draw in another form from the earth, the sun and the air, and that its perfection and distinction of type is directly dependent upon the success with which it obtains such nourishment in qualities and quantities suited to its particular needs. And in life we know that a man can give out only that which in another form he has previously taken in; and that the distinctness of his individuality and the value and amount of his productiveness will directly depend upon his knowledge of the sources of power which best sustain him, and upon his obedience to the laws which govern his nature.

And so it is in art. For the artist is not an independent worker having supreme control over the quality and number of his creations. He is part of a divine order of life from which all his efficiency springs, and the originality and sustained excellence of his work depend upon the degree to which he becomes conscious of his relation to that order, and upon his recognition of and obedience to its laws in their application to his life. Now the application of universal law which governs the life of an individual artist each artist must discover for himself through the process of living, but some of the laws themselves in their wider bearing upon all artists' lives may here be briefly enumerated. The artist, then, is first a man and is to know himself and the world; that is, he is to recognize the natural equipment for work with which he has been endowed, the degree and nature of its power and also its limitation; and he is to try to discover the place it should occupy in the world's entire economy. As a man he is also to recognize the importance of the physical side of his being and is to see that it be kept in the highest condition of efficiency for sustaining the work of his brain.

Then the artist is a member of a social body, and, if his work is to meet the highest demands of that body and to satisfy its best taste and judgment, he must obey the moral laws which require that he place himself in sympathy with that body. And herein enters the subject of compensation, for as a member of a social body the artist will increase in every possible way his own power for usefulness and good—and the power which rests in the wise use of money is one not to be ignored. On the other hand, if his work is to satisfy his own conscience and to secure him the largest degree of self-development, as well as to bestow the greatest benefit upon his client and to accord with the highest public welfare, he will not place pecuniary gain higher in the scale of values than he will excellence in the quality of the work he puts forth.

And now we come to the spiritual laws governing the life of an artist. We readily recognize the operation of physical and moral laws in our work, but we have yet to realize more fully that the artist is also a part of a universal spiritual order from which beauty of the highest kind has always come, and that if he is to produce a new beauty, an inventive beauty, which shall have a real and enduring charm, he must first absorb in other forms that which he creates. For beautiful things of lasting quality in architecture and in all the arts are not tricks of clever fancy which some fortunate ones may discover; they are the result of an assimilation of many kinds of order, and of beauty, and of truth, into the soul of the artist, where they undergo an unconscious process of transmutation into the creations which his imagination brings forth and which his knowledge, his skill and his character shape into new material form. He may obtain this nourishment from all sources which he finds will enrich him; from nature, from human experience, from religion, from literature, from painting, from the architecture of the past. But whatever sources he selects should be capable of refreshing him continuously. For the artist is constantly spending his vitality in creative work, and so must continually renew it. Both operations are equally important parts of a creative process and should be equally instinctive habits of the artist's life. They are analogous to the workings of nature in her method of giving birth to all living things, and such instinctive habits have always been those of the men of creative genius through whom all true art has been evolved.

Now, the architectural style of a country is the result of prolonged endeavor on the part of architects to erect buildings which shall accord with the best taste and with the soundest judgment of a people, and though the endeavors of those architects may often be thwarted and the accomplishment of their purpose seem at times a long way off, a higher power than their own will guide the course of events, and a mightier destiny than any private or public ambition will finally determine the quality and the permanence of the country's architectural style. Important movements in architecture, such as the so-called Romanesque of Richardson, occasioned by the influence of creative men of exceptional individuality, may prevail for a while. The demands of unhealthful social conditions such as inordinate accumulations of wealth by classes of people who lack corresponding degrees of culture may result in the vulgar and ostentatious over-adornment of their buildings. But the architecture of a country which will be truly representative in style, and which will endure with a lasting beauty, will voice the highest ideals of its people and will spring from the hearts of conscientious men who have accomplished the architectural expression of its noblest national life.

The attainment of such an architecture involves a process of growth which cannot be hastened. It requires a condition of wide and deep culture in the people of a country and a corresponding degree of culture in its architects; and though we have such culture in this country, either the reconciliation between the people who possess it and the forms through which it is trying to find architectural expression is not complete enough to point definitely toward the qualities which distinguish an architectural style, or the intangible nature of style prevents our recognition of as much of one as we may have. Perhaps, unbeknown to us, it is taking form in the many noble architectural monuments that have been and are being built by contemporaries. For all architectural beauty which is natural and vital to the best American life will contribute to the growth of an indigenous and inventive American architecture.

To further the growth of such an architecture in every possible manner should be our ambition; our methods should correspond with the noblest methods of men who are working for the benefit of mankind in other walks of life, and our hope of success should lie in a consciousness of our relation to the divine Source of all life, of all growth and of all accomplishment.

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"BELCOURT," NEWPORT, R. I.

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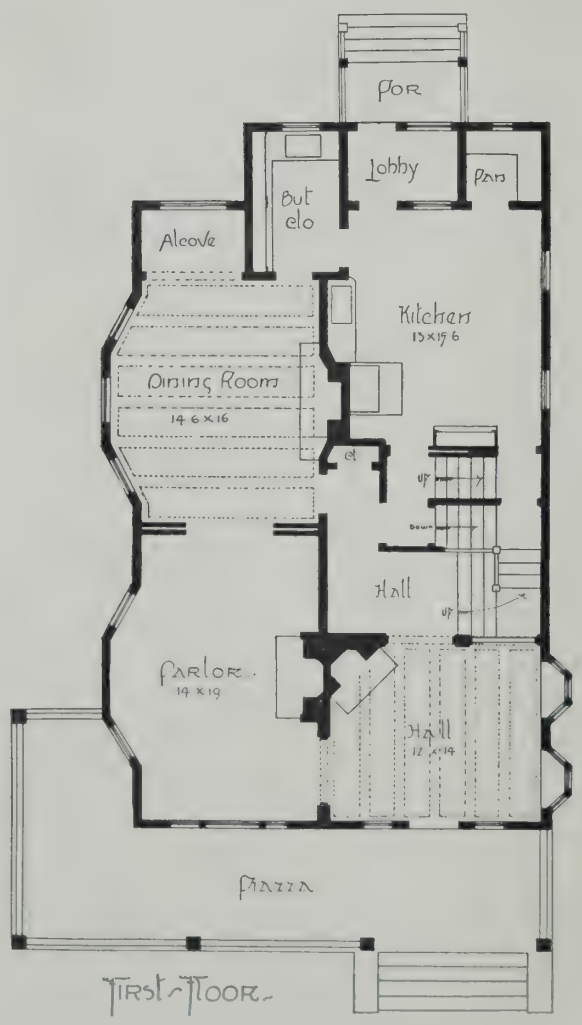
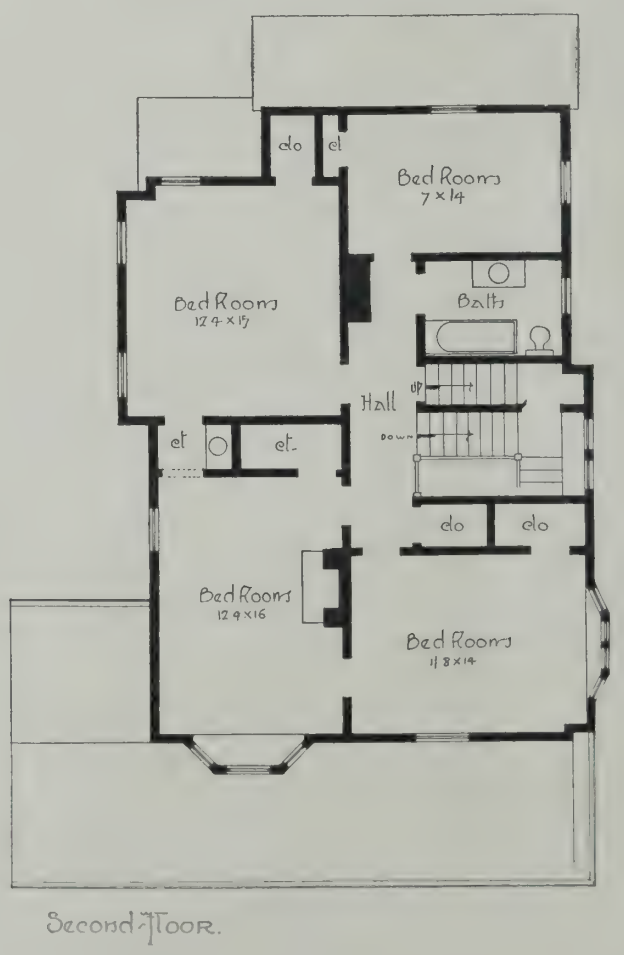
(Continued on page 35.)

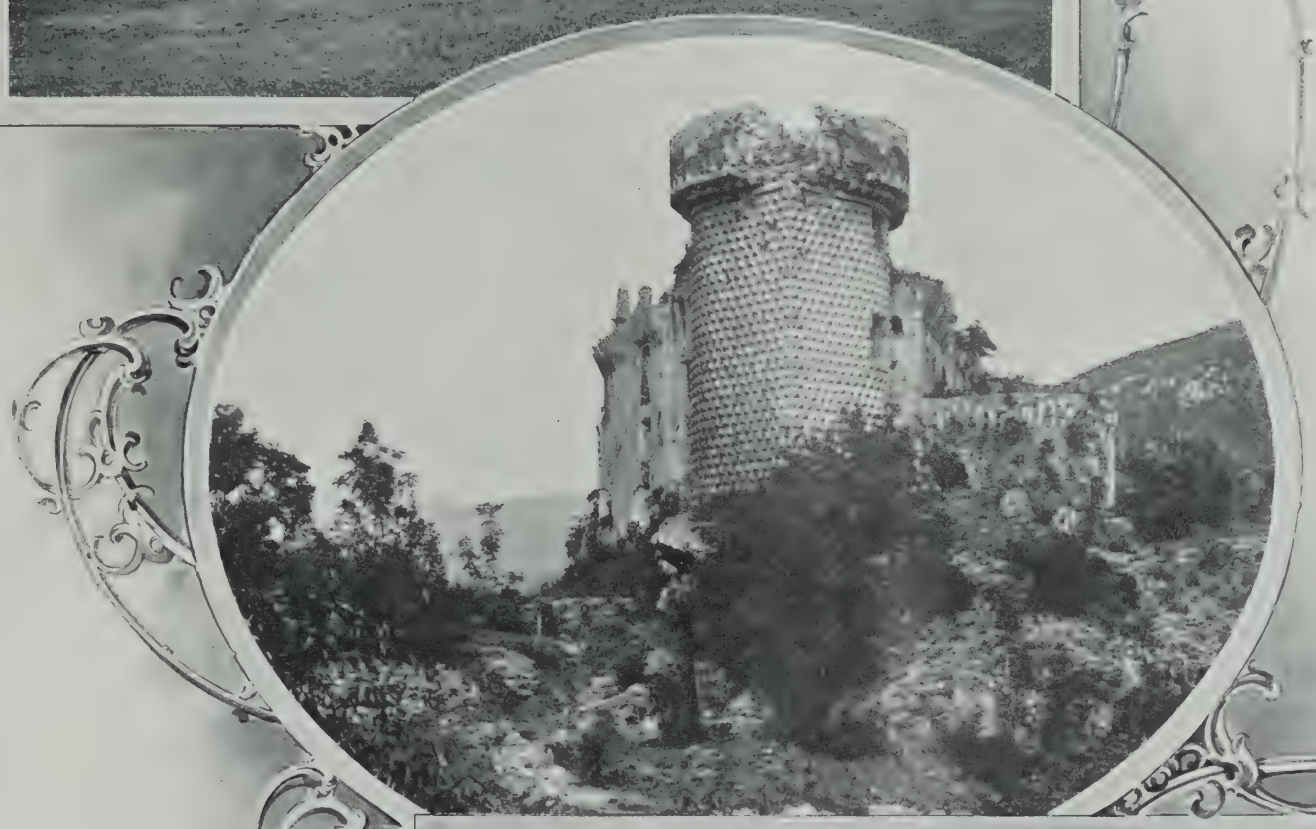




AN ENGLISH COTTAGE AT BENSONHURST, LONG ISLAND.—See page 35.

MR. JOHN J. PETIT, ARCHITECT.

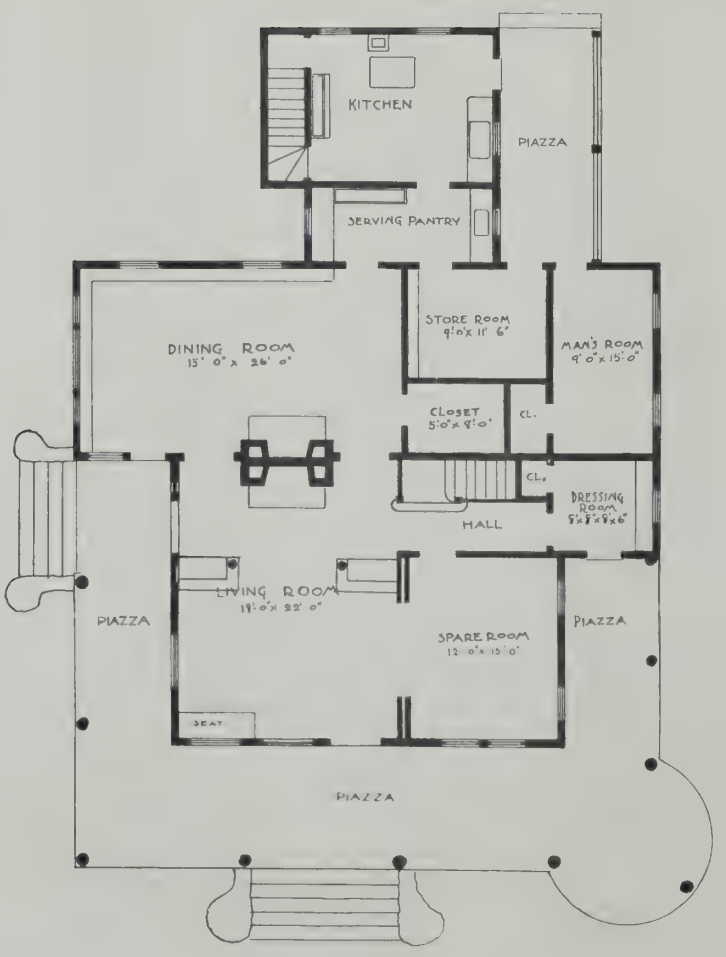
CASTLE FENE AT NUX.



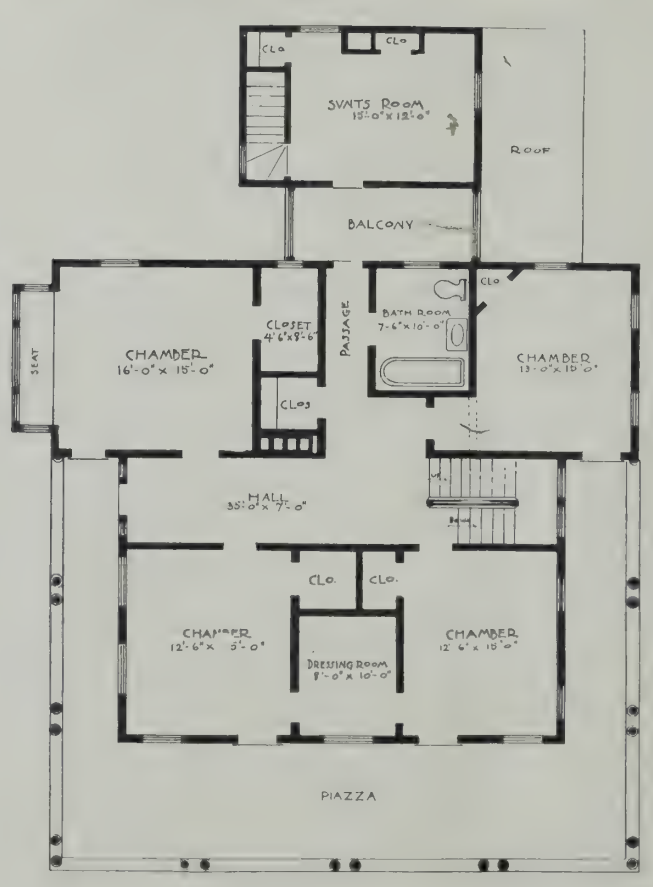
CASTLE GIOVANE, FINALBORGO.

RUINS OF THE ROMAN AMPHITHEATER AT AOSTA.

SOME PICTURESQUE BITS OF UNKNOWN ITALY.—See page 37.



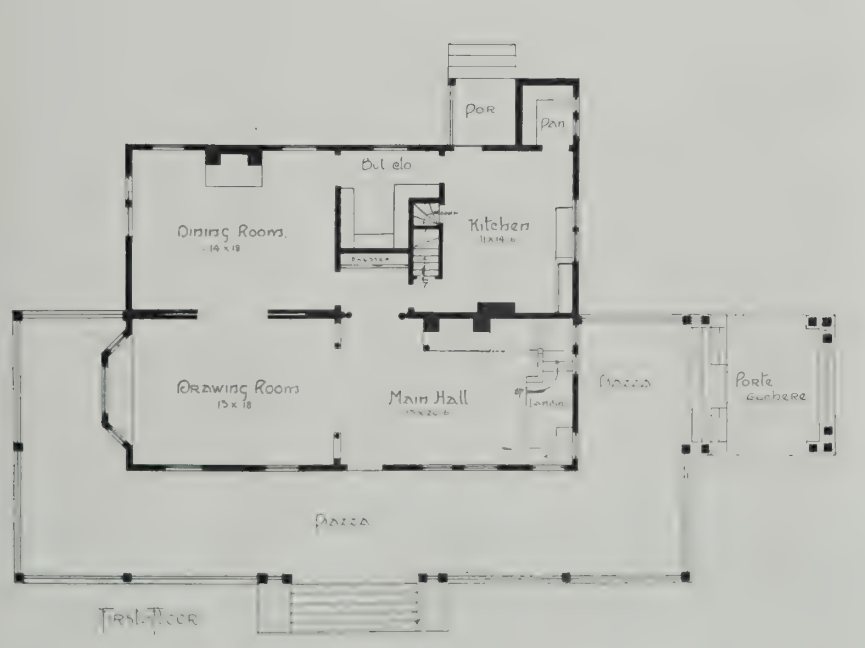
FIRST FLOOR PLAN

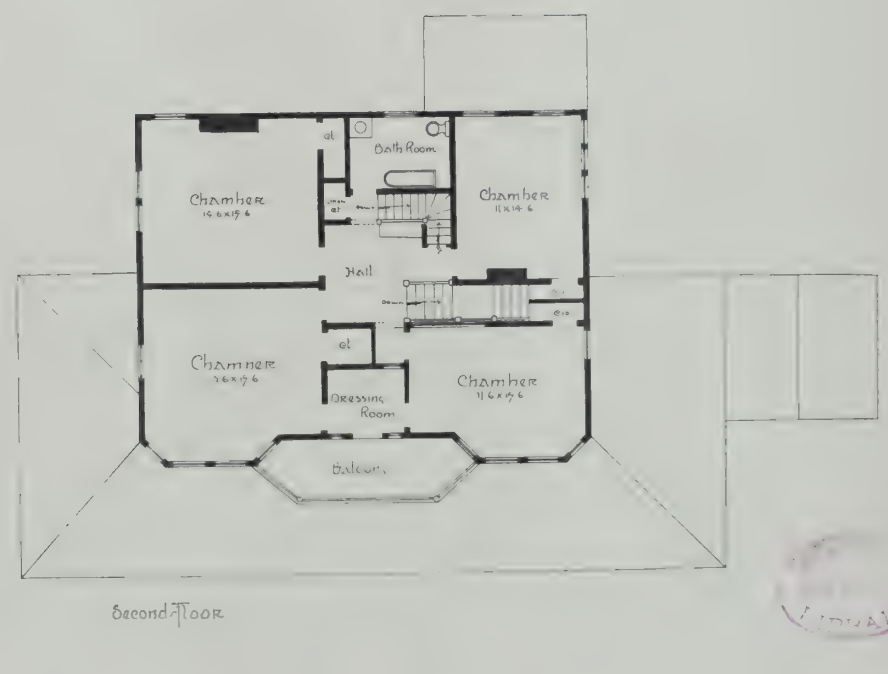


SECOND FLOOR PLAN

A SUMMER RESIDENCE AT WOODMONT-ON-SOUND, CONN.—See page 36.

MR. JOSEPH W. NORTHROP, ARCHITECT.





A SUMMER RESIDENCE AT ALLENHURST, N. J.—See page 36.

COAST LAND IMPROVEMENT COMPANY, DESIGNERS AND BUILDERS.

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MUSIC ROOM AT "BELCOURT," RESIDENCE OF O. H. P. BELMONT, ESQ., NEWPORT, R. I.—See page 23.

MR. RICHARD M. HUNT, ARCHITECT.

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HALL AT "BELCOURT," RESIDENCE OF O. H. P. BELMONT, ESQ., NEWPORT, R. I.—See page 23.

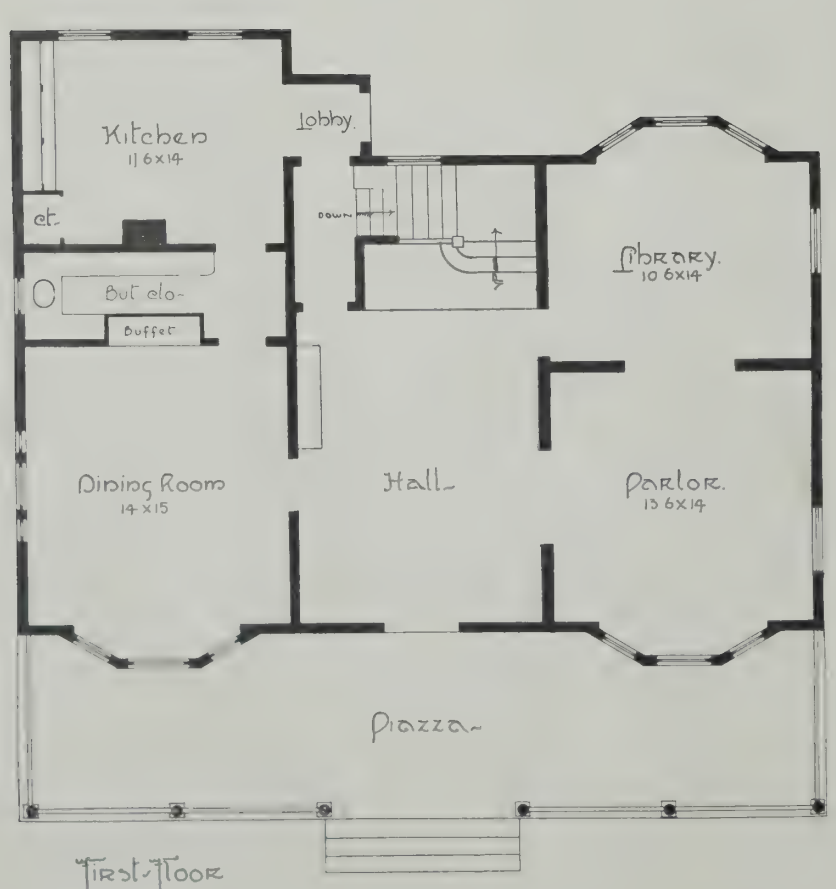
MR. RICHARD M. HUNT, ARCHITECT.

A COUNTRY RESIDENCE AT ALLENHURST, N. J.—See page 35.

COAST LAND IMPROVEMENT COMPANY, DESIGNERS AND BUILDERS.

A COUNTRY RESIDENCE AT ALLENHURST, N. J.—See page 35.

COAST LAND IMPROVEMENT COMPANY, DESIGNERS AND BUILDERS.

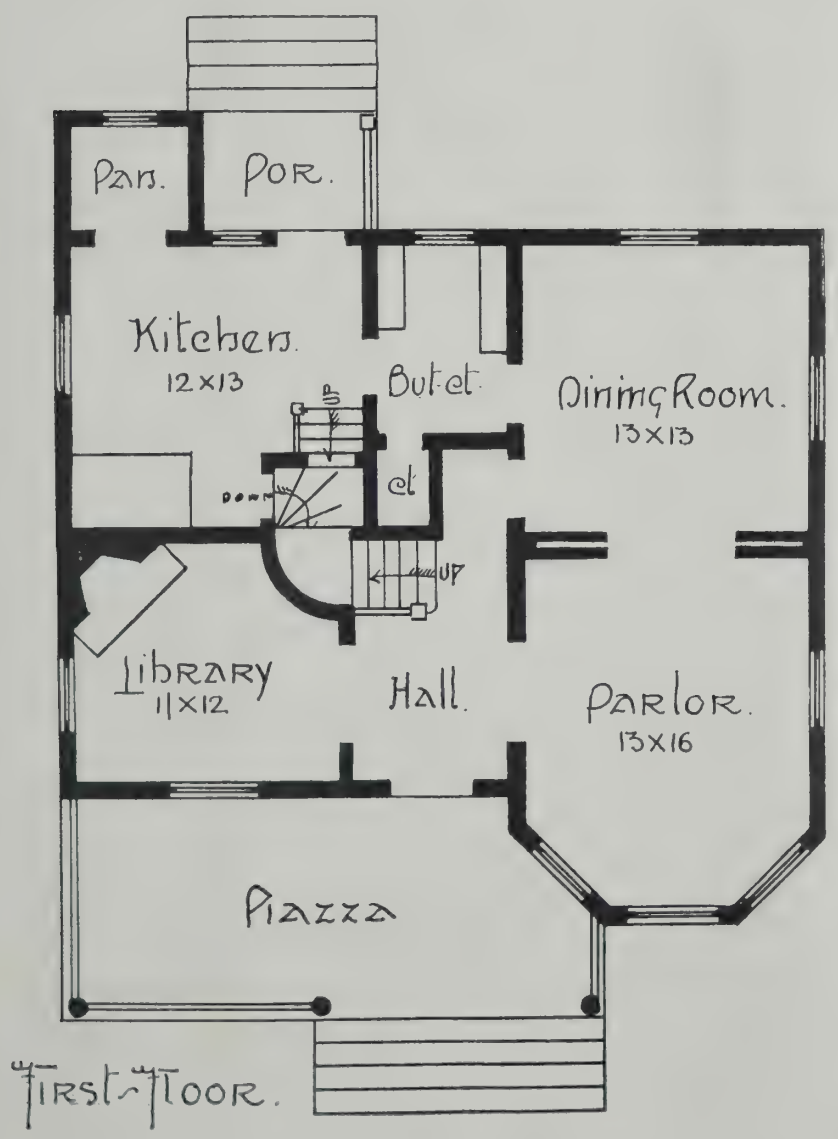


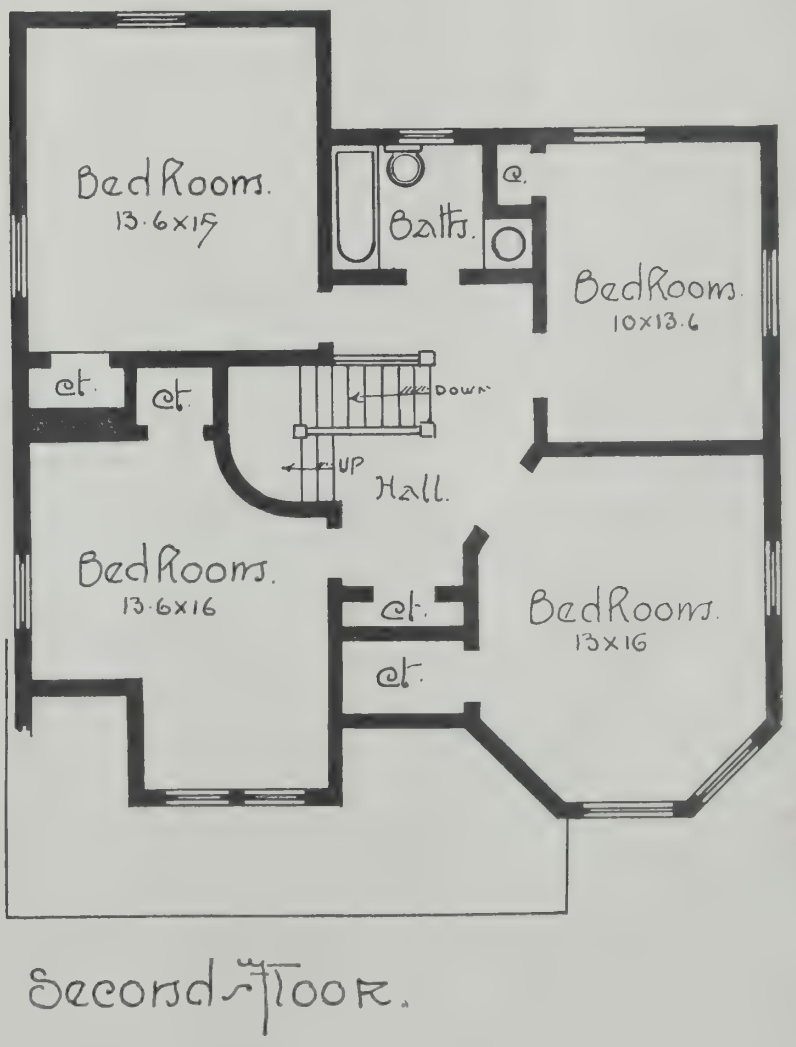
First Floor.

Second Floor.

A COLONIAL RESIDENCE AT YONKERS, N. Y.—See page 37.

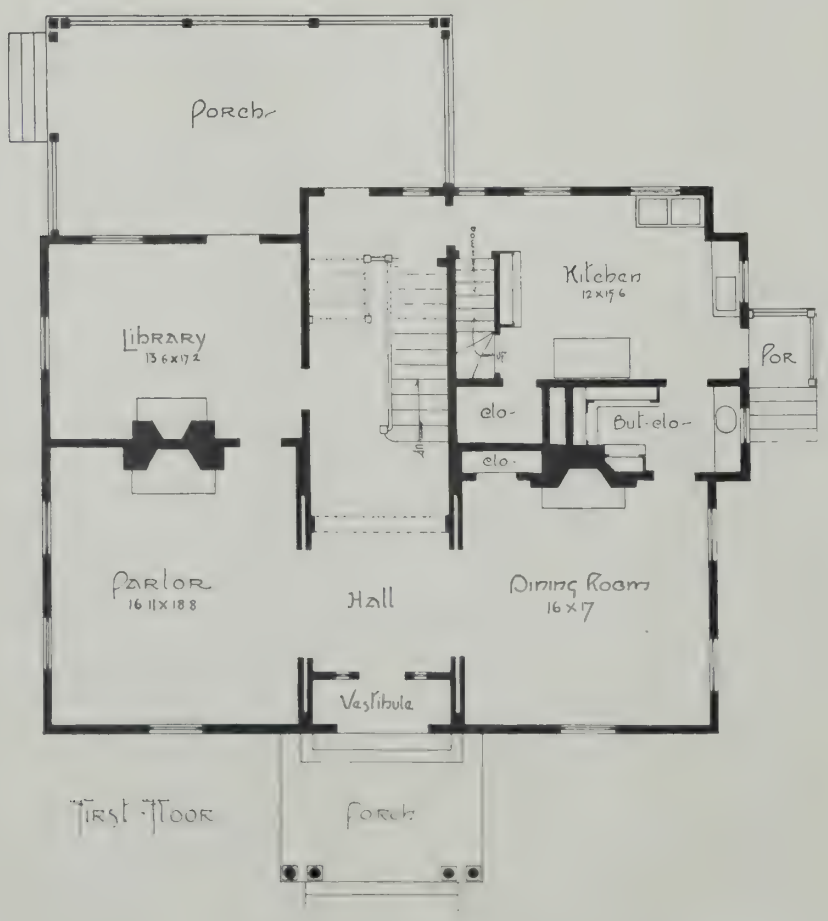
MR. LAURYNES, ARCHITECT.

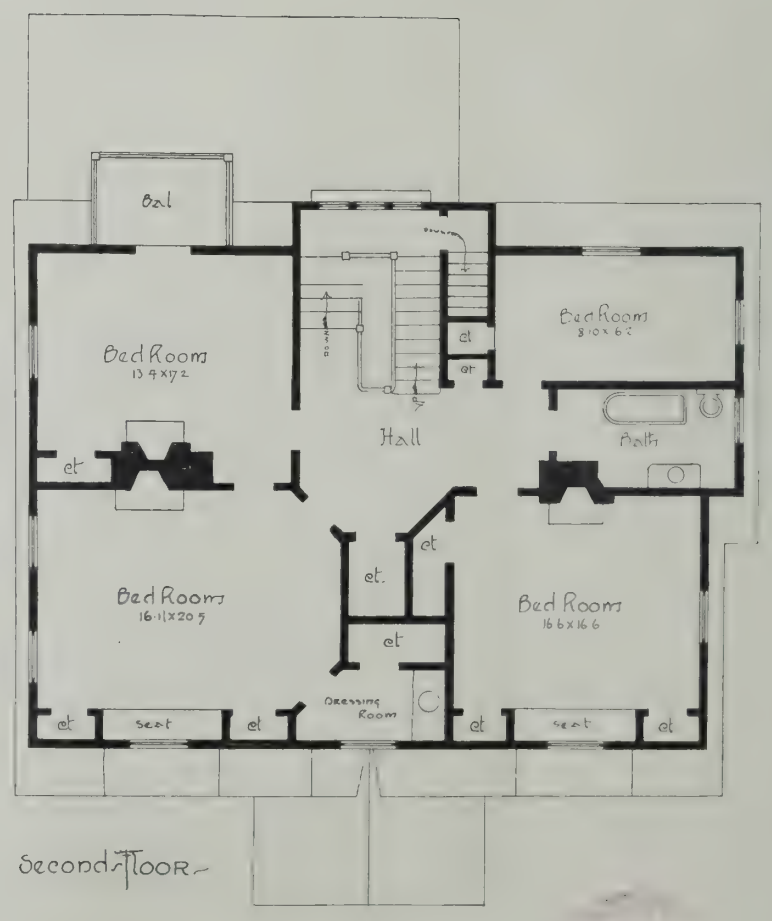




A MODERN DWELLING AT ORADELL, N. J.—See page 37.

MR. JOHN DEMAREST, ARCHITECT.





A MODERN RESIDENCE AT PLAINFIELD, N. J.—See page 35.

MESSRS. BENSON & BROCKWAY, ARCHITECTS.

"BELCOURT," NEWPORT, R. I

(*Continued from page 23.*)

horses and hospitality." That is to say, says Mr. Montgomery Schuyler in the Architectural Record, a palatial stable with an incidental apartment and an incidental ballroom. It is vigorous and direct in treatment and successful on the outside, while the materials are of stone and brick and rough-cast, and even more in the court, where a homely and effective picturesqueness is added to the frankness and directness of the exterior by the galleried arrangement and by the free Gothic of the detail. The music room is a large Gothic room, with possibly the largest church organ in New England at one end. This organ is actuated by electricity and is played by Æolian attachment. The room is used as a library and is decorated with stuffed horses, suits of armor, tapestries, etc. On the screen is a collection of boots, spurs, and stirrups, each one of which has a story. The room has a plaster vault, stained glass windows, and is lighted with gas and electricity. The hall is oak and has a beamed ceiling and stained glass windows. The dining-room is oval and is decorated in green and white. The room is in the Empire period and the chairs conform to this style. There are mirrors all the way round the ceiling except the bay windows, and those are closed by mirrors at night, producing a remarkably pleasing effect. See illustrations on pages 28 and 29.

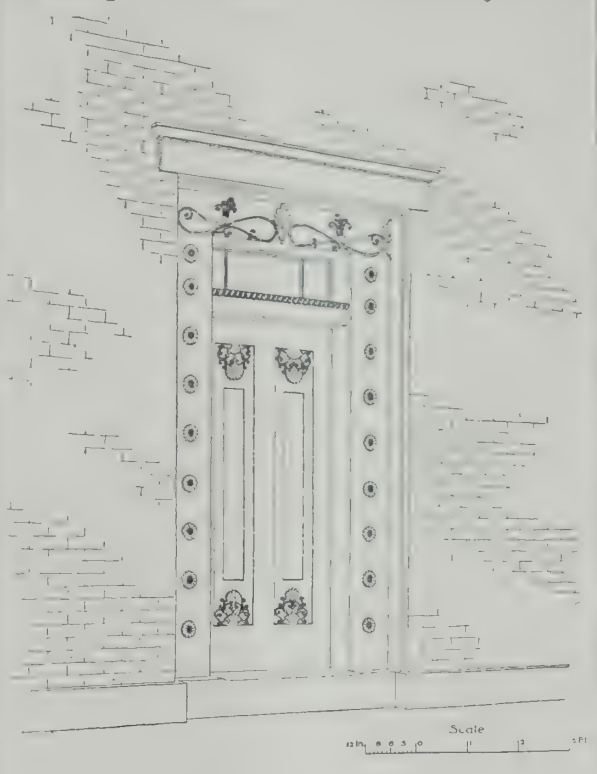
COLONIAL ARCHITECTURE.

BY HENRY RAUSCH.

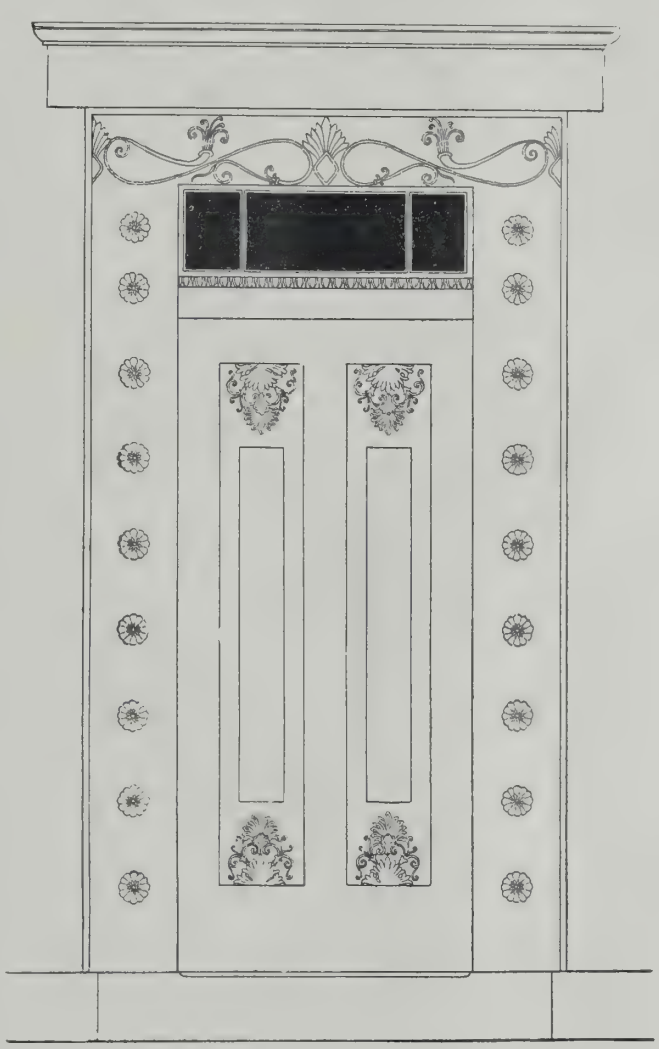
THE illustrations herewith are those of an old doorway situated in Second Street, near the Bowery. They show the plan, elevation, and section, and also give a perspective view, which is much more comprehensive than any geometrical drawing. This doorway is of the Colonial style of architecture; the ornament (which the writer has observed is rather an exception) has a decidedly Greek feeling.

The Colonial style was prevalent a few generations ago in the better parts of old New York. It was then dropped altogether for quite a number of years, but it is again used extensively (especially in the country) by a great many of our best architects.

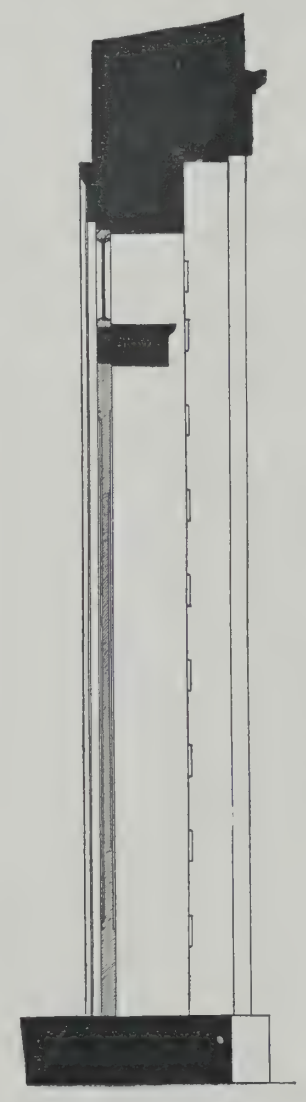
This doorway is located in a section of the city which was at one time fashionable but has long ceased to be so, and is now unfortunately neglected and falling to decay, like so much similar work which is so interesting to architects.



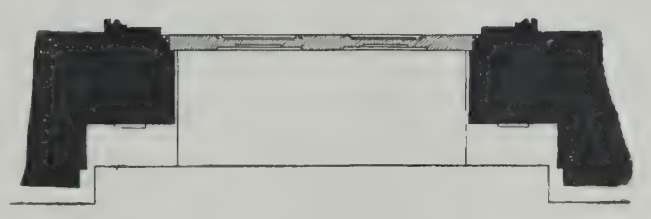
PERSPECTIVE VIEW



ELEVATION



SECTION



PLAN

AN ENGLISH COTTAGE AT BENSONHURST, L. I.

WE present as a subject for colors in this issue, and also on page 24, an English cottage which has been recently completed for Jerome Pennock, Esq., at Bensonhurst, L. I. The design illustrated presents a unique example for a modern suburban dwelling, is treated in a most excellent manner, combining artistic elevations and well arranged plans. The elevations have been given very careful study and are finely executed in all their details. It is treated in the English villa style, and its group of oriel bays and gabled ends are most attractive. The underpinning is built of red brick laid up in white mortar. The superstructure of wood is covered on the exterior framework with sheathing and paper. The first story is covered with clapboards and painted olive gray; the second story is covered with shingles and painted olive green. The beams and trimmings are painted light cream color. Roof is shingled and stained a dark moss green. Dimensions: Front, 30 ft.; side, 46 ft. 8 in., not including piazza. Height of ceilings: Cellar. 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior arrangement is most excellent and is treated with artistic effect.

The entrance is into a square reception hall, which is trimmed with oak and finished in a dark Flemish tone. It has a high paneled wainscoting, massive beamed ceilings, oriel bays with seats, and an open fireplace trimmed with Dutch tiled hearth and facings and mantel. The staircase is separated from reception hall by columns, which rise up to ceiling and support arch, and it is also provided with ornamental newel posts, balusters, and rail. The parlor is treated in ivory white, and it has a bay window and an open fireplace furnished with cream white enameled tiles, and a mantel of dainty design. The dining-room is treated in the Dutch style. It is trimmed with oak, and is provided with a paneled wainscoting, beamed ceiling, an attractive nook, and an open fireplace faced and hearthed with red Dutch tiles, and the whole finished off with a mantel of Dutch design. The kitchen and pantries are trimmed and furnished with all the best modern conveniences. The lobby is large enough to admit ice-box. The second floor is trimmed with cypress, and it contains four bedrooms, large closets, and bathroom, the latter wainscoted with tiles, and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor is also trimmed with cypress, and it contains three bedrooms besides ample storage. A cemented cellar contains laundry, furnace, and other necessary apartments. Mr. John J. Petit, architect, 186 Remsen Street, Brooklyn, N. Y. The house is heated by Johnson & Co., 84 John Street; is tiled by W. H. Jackson Sons, 248 Front Street, New York City. The Richardson & Boynton furnace and range are provided, and the bathroom and plumbing fixtures are by Ronalds & Johnson. The general contractor was Edward Johnson. The house cost $6,000 complete.

Our engraving was made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN RESIDENCE AT PLAINFIELD, N. J.

On page 34, in this issue, will be found engravings illustrating a modern residence which has been erected for Mr. J. P. Benson, at Plainfield, N. J. The building is treated in the Dutch Colonial style of architecture, and combines both attractive elevations and well arranged plans. The elevations are treated in a unique manner. The underpinning is built of local red brick laid up in red mortar. The superstructure is of wood, while the exterior framework is covered with sheathing, paper, and then shingles placed on in a most unique manner. These shingles are placed three in thickness, with the butts laid one-half inch to the weather. The whole exterior, including first, second, and third stories, is left to weather finish a natural silvery gray color. The trimmings are painted cream white. The roof is shingled and is stained a dark shade of moss green. Dimensions: Front, 46 ft.; side, 36 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with white pine treated in colors. The entrance is into a central hall, the extreme length of which is broken by an archway which springs from pilasters at each side of hall. This hall has a wainscoting and an ornamental staircase, with newel posts, balusters, and rail turned out in a dainty manner. This hall, and also parlor, is treated in old ivory white. The latter has a paneled dado running around the room, and an open fireplace built of Roman brick, with hearth and facings of the same, and provided with a mantel of special design. The library has a similar fireplace and the whole of the woodwork is treated in a bluish gray color. The dining-room is treated in old ivory white, and it has a paneled wainscoting, and an open fireplace built of Roman brick, with hearth and facings of same, and a mantel of special design. The butler's closet and kitchen are fitted up in a most complete manner with all the modern conveniences. The kitchen is provided with a Thatcher range. The second floor is treated in colors, principally cream white, and it contains four bedrooms, large closets, dressing-room, and bathroom. The bathroom is wainscoted and treated in white enamel, and it is furnished with a solid porcelain tub, marble bowl, and other fixtures, and exposed nickelplated plumbing. Meyer, Sniffen & Co. provided these fixtures. The third floor contains servants' quarters and trunk-room. Cemented cellar contains a Thatcher furnace, laundry, and other necessary apartments. The house is provided with combination gas and electric light fixtures complete. Cost, about $7,000, including everything ready for occupancy. Messrs. Benson & Brockway, architects, 55 Broadway, New York City. The builders were Wyman & Haberle, of Plainfield, N. J. Curtis M. Thorp, of Plainfield, N. J., furnished the mantels, fireplaces, and tiling.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COUNTRY RESIDENCE AT ALLENHURST, N. J.

WE present herewith, in this issue, on pages 30 and 31, a modern summer residence which has been recently completed for Francis M. Sutton, Esq., at Allenhurst, N. J. The building is treated in the most artistic manner with classic and Colonial detail, and is very effective with its cluster of columns and arches, and its massive Ionic columns at front entrance. The spacious and well shaded piazza with its porte-cochère entrance is a good

feature. The underpinning is built of brick and coated with Portland cement. The first story is covered with shingles and stained a dark green. The second story is plastered and finished in its natural silver gray color. The trimmings are painted cream white and the blinds are painted bottle green. The roof is stained a dark green. Dimensions: Front, 40 ft.; side, 68 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The main hall, parlor and dining-room are trimmed with oak. The hall is a large apartment, and it has bookcases built in, bay windows with paneled seats, an open fireplace trimmed with tiled facings and hearth, and a mantel of special design. The broad, spacious staircase is a good feature of the hall, and is separated from the hall proper by an archway with columns. The parlor and dining-room are separated by an archway with column effect, and the former has a paneled seat, and both have open fireplaces with tiled facings and hearths, and mantels. The dining-

A SUMMER RESIDENCE AT WOODMONT-ON-SOUND, CONN.

We present on this page and on page 26 a summer residence which has recently been completed for Mrs. Annie Cowles, at Woodmont-on-Sound, Conn. The building is admirably designed for a summer home, and it has many excellent features, including the spacious piazza and veranda, balconies, bay windows, and the roof, which is treated in the gambrel style. The underpinning is built of field-stone, laid up at random. The superstructure is covered with matched sheathing, paper, and then shingled throughout with fine shingles left to weather finish, while the trimmings are painted white. The roof is covered with shingles and treated similarly. Dimensions: Front, 24 ft.; side, 29 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft.; third, 8 ft. The interior arrangement is most complete. The walls and ceilings throughout are ceiled up with narrow beaded North Carolina pine. An attractive feature of the living room

A SUMMER RESIDENCE AT ALLENHURST, N. J.

We present on page 27, in this issue, a design of a summer residence which has been erected for E. C. Allen, Esq., at Allenhurst, N. J. The design is unusually attractive in the manner in which it is treated. It has a broad, spacious, and well shaded piazza, balconies, bay windows, and the main gables and porte-cochère, which are beamed and stuccoed, are all good features. The underpinning is built of brick laid up in red mortar. The superstructure of wood is covered on the exterior framework with sheathing and paper. The first story is clapboarded and painted yellow, with ivory white trimmings. The second story is covered with shingles and left to weather finish a natural silvery gray. The posts at piazza and porte-cochère are of yellow pine, finished natural with hard oil. The gables are beamed, and the spaces are filled in between with rough stucco work, and treated in yellow. The roof is covered with shingles and treated in a moss-green. Dimensions: Front, 42 ft.;

A SUMMER RESIDENCE AT WOODMONT-ON-SOUND, CONN.

room has a most artistic corner in the combination of china cabinet, buffet, and alcove built in, with seat. The library is isolated to one end of the house, where quietude and rest can be obtained. The butler's pantry and kitchen and its apartments are trimmed with cypress, and are fitted up complete with all the modern conveniences. The second floor contains five bedrooms, with large closets and stationary bowls, two dressing-rooms, and bathroom; the latter is plastered with asbestos plaster, and treated in imitation of white enamel tiling, and it is furnished with porcelain fixtures and exposed nickelplated plumbing. This floor and third floor are trimmed with cypress finished natural. The third floor contains four bedrooms, bathroom, and trunk-room. A cemented cellar contains furnace, laundry, and other necessary apartments. The floor is laid with maple, and the remainder with hard pine, all finished with hard oil. This house was designed and built by the Coast Land Improvement Company, of Allenhurst, N. J.

Our engravings were made directly from photographs of the building, taken specially for the Scientific American.

is the massive beam supported on polished columns, and the broad, open fireplace built of rock-faced field-stone laid up at random, while the whole is finished with a massive wood shelf. The stairs run up in alcove at side and are provided with ornamental newels, posts, and balusters. Beneath this stairway there is a dressing room used for salt bathing, with outside entrance thereto. The dining-room, of good dimensions, is provided with a similar fireplace to the one in living room. The kitchen, sewing-room and pantries are all fitted up in the best modern manner, respectively. The second floor contains a large, open and airy hall, four bedrooms, five closets, dressing-room, bathroom, and servants' bedroom, with private stairway and kitchen. The bathroom is furnished with a Standard porcelain tub, and J. L. Mott's fixtures, and exposed nickelplated fixtures. The third floor contains several rooms and ample storage. There is a cellar under part of the building, while the remainder rests upon piers. Mr. Joseph W. Northrop, architect, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

side, 34 ft., not including front piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior arrangement is most complete, and it is planned with an open effect, so that the entire floor can be thrown into one apartment when desired. The living hall is a most attractive and artistic apartment. It is trimmed with quartered oak, and it has a paneled wainscoting of similar wood. The numerous columns with Ionic capitals, forming an arcaded effect, is most attractive. The staircase, with its broad landing and paneled seat, is quite a feature of the hall, together with the open fireplace, which is built of brick, with facings and hearth of same, and mantel made from a special design. The parlor is trimmed with cypress and finished natural. It is separated from the hall by an archway with columns, with paneled base and caps. The dining-room, of large dimensions, is also trimmed with cypress, and it contains an open fireplace built of brick, with facings and hearth of tiles, and mantel with china cabinets built in. The butler's pantry and kitchen are trimmed with cypress, and are furnished with all the best modern conveniences. The second floor contains

four bedrooms, dressing-room, and bathroom. This floor is trimmed with cypress and finished natural. The bathroom is coated with asbestos plaster, which is treated in imitation tiling, and it is furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains four bedrooms and trunk-room. A cemented cellar contains furnace, laundry, and other necessary apartments. The Coast Land Improvement Company, of Allenhurst, N. J., designed and built this house.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL RESIDENCE AT YONKERS, N. Y.

The engravings presented on page 32, in this issue, illustrate a residence of Colonial treatment which has been erected for E. E. Allison, Esq., at Yonkers, N. Y. The outlines, though square, are sufficiently broken to give an attractive appearance to the exterior. The underpinning is constructed of rock-faced local granite. The superstructure is covered on the exterior with sheathing, paper, and clapboards, and the whole is painted Colonial yellow, with ivory white trimmings. The roof is covered with shingles and stained a moss green. Dimensions: Front, 43 ft.; side, 34 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior throughout is trimmed with oak. It contains a broad, spacious hall, with an ornamental staircase rising from a broad landing, with newels, posts, and rail turned out of oak. This stairway is lighted effectively by a stained glass window. The parlor and library are connected, and each has bay windows thrown out at front and rear. The dining-room is lighted by a cluster of windows with stained glass transoms, and it is provided with a nook and buffet built in. The butler's pantry is conveniently located, and it has dressers, cupboards, and sink fitted up complete. The kitchen is wainscoted and fitted up with the usual fixtures complete. The second floor contains one large bedroom and dressing-room, two single bedrooms, one servants' bedroom and bathroom. The latter is wainscoted and paved with tiles, and fitted up with porcelain fixtures and exposed nickelplated plumbing. The third floor contains two rooms and ample storage. A cemented cellar contains furnace, laundry, and other necessary apartments. Mr. Laurynes, architect, New York City.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

SOME PICTURESQUE BITS OF UNKNOWN ITALY.

THE old days of Italian travel are passing out of recollection. The slow approach to each long-heard-of but unseen Italian city gave a very different feeling toward it from that which is produced by being whirled by a train into a railroad station. Now we have to seek afar from the usual routes of travel the more picturesque spots which were not entirely neglected in *vetturino* days. Almost every Italian town is now connected to its neighbor by a line of railway, but there are still many spots which the visitor with his month or six weeks can touch upon, if he will leave the beaten path for a few hours. Our full-page engraving on page 25 shows three of these picturesque spots.

Nux, in Piedmont, is one of the beauty spots of the Old World. The Castle of Fene is most imposing, tower being piled on tower. It is the kind of castle which is apt to associate with grand opera, but in reality there are many such castles in Italy and Southern France. They stand the climate well, and after hundreds of years seem to be ready to repel every invader.

Finalborgo, in the Riviera di Genova, can boast of a similar fortress, the Castle Giovane, whose round tower gives a singularly sinister appearance by its being faced with diamond-shaped bricks. It is doubtful if there is any castle which is much more picturesque. Aosta has many Roman remains, including the triumphant arch of Augustus and the triple-arched Porta Prætoris. The Roman walls enclose a rectangular area measuring 2,370 by 1,860 feet. The walls originally had many square towers. Several of these were altered during the Middle Ages into fortresses. The facing is of hewn stone and has in part been torn away for building material. There is an impressive piece of the back wall of a theater, over seventy feet high, shown in our engraving. It is four stories in height and has scanty remains of an amphitheater 282 by 242 feet in plan. Eight arcades of the exterior facing remain, with Doric semi-columns.

A MODERN DWELLING AT ORADELL, N. J.

WE present herewith, on page 33, a modern dwelling which has been erected for Mr. Milton Demarest, at Oradell, N. J. The design presented shows an excellent example for a suburban dwelling, while it contains all the conveniences of a town house. It is built with the best quality of materials and in a thorough workmanlike manner. The underpinning is built of red brick laid up in red mortar. The superstructure, of wood, is covered on the exterior framework with sheathing paper, and the first story is clapboarded and painted Colonial yellow with ivory-white trimmings; the second story is covered with shingles and stained a sienna, with similar trimmings. Blinds are painted apple green. The roof is covered with shingles and finished natural. Dimensions: Front, 35 ft.; side, 32 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior arrangement is most complete, and the whole is trimmed with cypress and finished natural. The hall contains an ornamental staircase, with turned newel posts, balusters, and rail. The library is located at the left of entrance, and is provided with an open fireplace built of brick, with hearth and facings of tile, and is provided with a mantel of excellent design. The parlor and dining-room are separated by sliding doors, and each are well lighted and ventilated. The butler's pantry and kitchen are fitted up and provided with all the necessary improvements found in a well regulated dwelling. The second floor contains four bedrooms, ample closet room, and one bathroom, the latter furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains one bedroom and ample storage room. A cemented cellar contains furnace, laundry, and other necessary apartments. Mr. John Demarest, architect, New Milford, N. J.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

THE PAVILION OF BELGIUM AT THE PARIS EXPOSITION.

THE Pavilion of Belgium on the "Street of Nations," on the bank of the Seine, is located between the British and Norwegian sections. It is a splendid example of Flemish architecture, and reproduces the best portions of some of the more celebrated town halls and municipal buildings in Belgium. The central tower is an exact reproduction of the Hôtel de Ville at Audenarde, whose architect, Van Pede, has been called the Benvenuto Cellini of stone, for by hardly any other artist has stone been rendered so delicate and lace-like in a building. The ground floor is devoted to a press exhibit, and here will be found all the newspapers, periodicals, etc., published in Belgium. In the next department are arranged views and models of the principal buildings of Flanders. In the basement is a beer vault. The first floor contains an exact reproduction of the great chimneypiece at the Hôtel de Ville at Audenarde. The walls are adorned with frescoes and tapestries and there is a splendid exhibit of ancient Flemish tapestries. There are also reception rooms richly hung with tapestries. We give an illustration on our first page.

Architectural Education.*

BY ALEXANDER BUEL TROWBRIDGE.

THE very recent agitation affecting the motto, "Progress before Precedent," has attracted the attention of the professors of architecture, who have noted with regret that some of these architectural walking delegates have assumed unfriendly, even hostile, attitudes toward the schools. It is safe to assume that men differ in a great variety of ways in their interpretation of this motto, and that probably very few of the "young men of the Middle West" really hope, down in their hearts, that the schools will drop precedent and reorganize on a Nature-study basis. Possibly it is overstating it to assume that this is the wish of Mr. Dean and his friends; yet that is what one may very easily gather from Mr. Dean's several articles which have appeared within the past year in the architectural magazines. An accepted definition of an anarchist is "one who believes the world so good as to need no laws." While such a state of affairs is devoutly to be wished, no one in this assemblage believes for a moment that it would be safe, or even reasonable, for us as a nation, for instance, to suddenly drop our system of laws and enforcement of laws. In the same way we may accept in perfect faith all that Mr. Dean advocates as something very desirable, but we cannot for a moment dream of flying from the traditions, the laws, the precedent, that have been willed to us by our professional forefathers. We are inclined to the opinion that the "young men of the Middle West" are taking themselves too seriously. At present we agree with Messrs. Wyatt and Nolting, of Baltimore, who very aptly state: "We suggest that, before writing and theorizing more on the subject, he would produce actual work by his proposed methods, which will be accepted by the art world as superior to that produced by the training of either the American or European schools." The professors of architecture will give an enthusiastic reception to any new piece of work which shows truth, logic, and fitness. It must not be forgotten, however, that no matter how excellent some of this inventive work is to be, it cannot reduce the intrinsic merit of some of the modern buildings which we have all enjoyed together, and which everywhere show the influence of precedent.

* Paper read at the Second Annual Convention of the Architectural League of America, at Chicago.

We recall a sentence from something that was said, if we remember rightly, by Mr. Sullivan, to whom many turn in their search after originality. If the quotation is not exact, at least the meaning is the same, "Learn what is in the books, and then throw the books away." There is a good deal of sound wisdom in that advice for men of Mr. Sullivan's strength, but how many consider themselves in his class? Suppose, for example, we should accept this advice and apply it to the students in our schools. How long would it take the average student to learn what is in the books? We think a lucky man would, perhaps, feel that he had a good grasp of what the books contain after he had practiced architecture twenty-five or thirty years. We know some humble-minded professors of architecture who feel that three-score years and ten are not enough time for the proper study of architecture. Suppose, now, we adopt the modest plan of flying from precedent, depending upon the natural talent and inventive genius of our students for our academic results. We turn a class of beginners loose in a draughting room, lock the library doors, issue a program which calls for some architectural character, and then wait for the sparks of genius to illuminate the blank sheets of Whatman. We might extend the experiment so that it would be fully tried upon one class of students during its entire four years of stay with us. What would be the result? Our students would either emigrate to the "Middle West" and become great architects, or they would hurl maledictions at us for the rest of their lives. The latter is the more probable result.

It may be that we have been extreme in our assumption that Mr. Dean and his co-workers desire so great a departure from precedent. If, however, one bit of historic detail is inappropriate to our age, why are not all bits of historic detail? If it is wrong to use a Greek triglyph or a Greek column to-day because they belonged to a past civilization, then no classic moldings are allowable, and even the carpenters in their ignorant use of the classic cyma reversa will have to devise something to take the place of the innocent ogee molding, in order to be consistent.

The profession of architecture as well as the vast thinking public have cause to be thankful that the schools of architecture are taking a stand for conservatism in teaching. If we were to allow ourselves to be carried away by the delusion that we might achieve fame by experimenting upon our students in the search for an original style of architecture, we would be infamous. We would be betraying a trust more sacred than any trust that is encountered in the practice of architecture. In practice an architect has the responsibility of disposing of his client's money, and of so using it that the community concerned will be enlightened and educated. His is a trust which should not be broken through this egotistical belief in one's power to revolutionize architecture. How much greater is the responsibility of the professors of architecture who have in their hands the futures of a group of young people!

Our duty toward our students is, first, to teach them to construct according to modern practices; second, to express themselves in black and white, in color, and in plastic materials; third, to habituate them to good methods of study in the art of designing. Add to this the various courses in history of architecture, history of art, etc., and we have in a nutshell an outline of a course which is conservative, and yet capable of the development of a perfectly safe amount of originality.

It is not necessary to go into the details of the many courses which are required of students in developing them in the three directions stated. It is sufficient to remark in passing that the essential policy for success in the development of a school is insistence upon a stiff entrance requirement and alertness in keeping to the standard set by the best architectural students in the world—the French. Mr. Dean is mistaken in holding that, because some of the recently returned students of the Paris school have the bad taste to erect French buildings in our cities, therefore both European and American schools are at fault. Because one dog goes mad it does not follow that all dogs should be muzzled and their mothers shot.

The ideal education of an architect is for him to first take an A.B. degree in some college or university where contact with professors and fellow-students in the so-called liberal studies will broaden his attitude toward the world. Then let him take his professional course of four or five years in a conservative school where good principles, not original theories, are taught. If he be a genius, his four years in a professional school cannot possibly repress him. His individuality will show through all the conservatism of his teaching. If we have not great talent, as is the case with many students of architecture, his conservative teaching will have been his professional life preserver. Not only he, but the community with which he is connected, will fervently thank the men who, believing in and loving originality and invention, still had the courage and common sense to teach traditions.
—The Brickbuilder.

PRISMATIC LIGHTING FOR THE ILLUMINATION OF DARK INTERIORS.

BY DR. WM. H. GREENE.*

THE practical application of the refractive property of the lens or prism to change the direction of light rays passing through it, for the purpose of artificial illumination, originated with the French physicist, Fresnel, who first suggested its use in lighthouses, for the protection of maritime coasts, about the year 1815; and the Fresnel lens in various modifications is to-day solely used for this purpose.

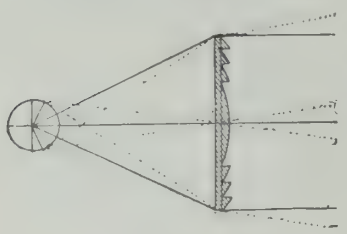


FIG. 1.

The Fresnel lens is designed for projecting a powerful beam of parallel light upon objects to be illuminated at a distance. The principle of this device is seen in Fig. 1, which shows a central plano-convex lens surrounded by a series of rings or segments of lenses or prisms, to which successively diminishing curvatures or angles are given in order to give them a common focus.

Within the past four or five years the application of this principle has been made, and with decided success, to the illumination of dark interior spaces, where the amount of light naturally entering therein is insufficient for satisfactory illumination, and artificial lighting must occasionally or constantly be resorted to.

The requirements of public buildings and modern office buildings, in this respect, have been most urgent, and the various devices known generally by the name of "prismatic lights" have been extensively used for the purpose, and have proved so useful that in one or another form they have come to be regarded by architects and builders, not to speak of a great number of householders, as indispensable.

It is the purpose of this communication to give a brief review of the art of prismatic lighting, which, at the present time, is passing through the active stages of the course of evolution, to which all the arts are subject, in determining the survival of the fittest.

Omitting, for the present, consideration of the vault light for basements and cellars, where but one form of prism, namely, an approximately right-angled prism depending on total reflection for its utility, is admissible, there are two general methods in vogue of installing prismatic lights to meet the requirements of service.

In one of these, the sheet of prismatic glass is placed in a window-frame in the vertical position, thus taking the place of the window light. In the other, the sheet of prismatic glass is installed in a more or less inclined position, projecting outwards from the window opening. This form of construction is known in the trade as a "canopy."

The question as to which of these two forms of installation will give the best results is determined by the extent of the sky opening upon which dependence must be placed for light.

Where this is of considerable area, as, for example, where the windows face a wide street, the prismatic glass set into the window-frames in the vertical position will give satisfactory results.

Where the windows receive their light from a restricted area, as, for example, in court-yards or the side-yards of dwelling houses, and generally in the many situations where high walls rising in close proximity cut off the free access of light from above, the projecting, canopy, form of prismatic glass is preferable.

Speaking in a general way, the change from the vertical to the canopy form of installation will be indicated when the incident angle of the light falling on the window opening averages 60° from the horizontal plane.

The popularity achieved by the use of light projecting devices of this general nature has called into existence a great number of patented inventions, some claiming special forms of prism construction (in combination, in certain cases, with a prismatic or lenticular formation on the reverse side of the glass), and of a far greater number of design patents and methods of glazing, and other matters of minor detail.

For the purpose of this communication, these minor devices may be left out of consideration, and the several generic forms of prism construction only will be given attention.

These may be divided into two general classes:

(1) Those in which the glass forming the light-projecting device consists of sheets having on one surface a series of prisms or segments of lenses of any desired angle, the back of the sheet being a plane surface, and

(2) Those in which the glass forming the light-projecting device consists of sheets having on both surfaces a series of prisms or lenses.

*Paper read before the Franklin Institute at the meeting held Wednesday, June 20th, 1900, and published in the Journal of the Institute.

The prism glass most generally known and used is that of the first-named class.

The action of a section of prism glass of this construction is shown in Fig. 2, in elevation and plan. It is obvious that the general refracting effect of the prismatic surface in this and in the other forms of prism glass will be substantially the same, whether the refractive surfaces of the structure be straight (*i. e.*, prismatic), or more or less curved (*i. e.*, lenticular), irrespective of the angles of the prism sections or of the curvature of the lens segments. It is important, however, that these angles (or curves) be carefully considered, since upon the correct appreciation of this element the light-projecting efficiency of the structure largely depends. Improper angles (or curvatures) may greatly diminish the efficiency of the device, by the dispersion and loss of light, caused by total reflections in the interior of the glass.

There is general misapprehension regarding the proper action of light-projecting glass, which needs a word of reference. It is assumed by many that the prismatic light should be so constructed that all the exterior light transmitted from the interior boundary of the prismatic window, or canopy, should be directed in lines substantially parallel to the boundary walls, floor and ceiling of the apartment, and that the more nearly this condition is realized, the closer will be the approach to the theoretically perfect mode of operation. Some of the manufacturers of prismatic glass endeavor to realize this condition by varying the angles of the prisms uniformly from the center to the edges of the sheets, on the principle of the Fresnel lens.

A little consideration of what is intended to be realized by prism lighting of interiors will suffice to show that this view is an erroneous one and liable to result, in practice, in a much inferior interior illumination than can be otherwise obtained.

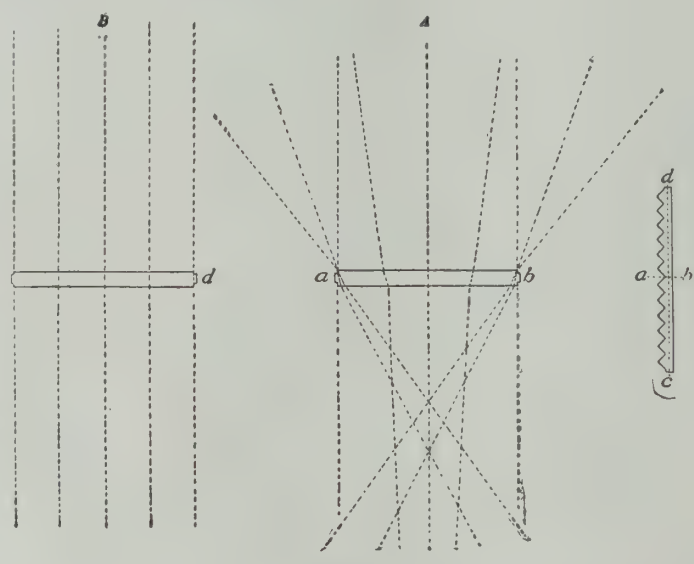


FIG. 2.

This criticism will be understood by stating the general proposition, that the objects of prismatic lighting are, first, to direct as much extraneous light into the interior as possible, and, second, to direct it in such a manner as to derive the largest possible benefit therefrom.

In considering the relative merits of parallel and divergent light transmission by prismatic glass, it should be said that practically as much extraneous light can be directed into the interior space to be illuminated by the one as by the other arrangement of prisms or lenses. But, when we come to consider the second portion of the proposition, it can easily be shown that the system of transmitting the light in parallel lines cannot possibly be as effective as the method of divergent transmission, and more especially, divergent transmission in both vertical and horizontal planes, and for the following reason:

It is well known that the best effects in interior illumination are realized when uniform diffusion throughout the apartment is obtained. This effect can be secured most effectively only when all shadows are obliterated by calling into requisition the action of the entering light reflected from all parts of the side walls, floor and ceiling of the apartment.

By the method of directing the transmitted light in parallel lines, the ill-effects of shadows cast by opaque objects in the path of the entering light will be realized in the extremest degree, as there will be no ameliorating influence to counteract and neutralize the shadows by reflection from the bounding walls and floor of the apartment; and an inspection of the condition of an apartment thus treated will disclose this objection at once.

By the method of divergent transmission, while quite as much or more extraneous light is thrown into the apartment as by the other method, its distribution is decidedly more advantageous, from the fact that the repeated reflections from the bounding surfaces of the apartment cause the practical obliteration of all shadows and a practically uniform diffusion of the light to all parts of the interior.

Returning now to the descriptive portion of the subject, the *modus operandi* of the simplest form of a light-projecting prismatic window is shown in the plan views in Fig. 2, *A* and *B*, in which the light from an exterior source falling upon the plane, outward surface of the glass is refracted at the boundary of the interior prismatic surfaces and projected into the room to be illuminated.

Fig. 2 *A*, which is a plan view of this construction taken on the line *a b*, exhibits the effect of the light distribution, in vertical plane from the effect of refraction from the terminal portions of the prism, where the influence of the more oblique rays is not counteracted by a modification of the angles of the prism from the center line to the upper and lower edges of the glass. Fig. 2 *B* is a plan on line *c d*, showing that the light rays are not distributed divergently in the horizonal plane, but are all directed in parallel lines.

Figs. 3 and 4 represent the action of prismatic glass of the second class, *i. e.*, in which both surfaces are prismatic or lenticular.

Fig. 3 shows a form of light-projecting glass that has lately come into use, and for which certain advantages are claimed over the construction previously described. The sheets in this form of prism glass have one surface furnished with prisms—commonly placed towards the room to be lighted—and the other surface formed of a series of lenses of small curvature, distributed in panel form, *parallel* to the direction of the prisms. This construction, as well as that shown in Fig. 2, manifestly exaggerates in the vertical plane the divergent distribution of the transmitted light, and consequently operates, so far as it goes, in the correct manner, utilizing the reflecting action of ceiling and floor in diffusing the light.

The construction shown in Fig. 3 possesses one obvious advantage over the several modifications of class 1, namely, that the lenticular form of exterior surface arrests and directs into the dark interior to be lighted a certain amount of the exterior light, which, with the plane exterior surface of class 1, would be lost by total reflection from the exterior plane surface. Practically all of this additional light thus projected into the dark interior would be gained if the angle of the prism and the curvature of the lens panels were correctly adapted to the length of the apartment to be lighted.

The latest modification of class 2 remains yet to be considered.

In this, the interior prismatic surface of the glass is the same as that just described, but the exterior lenticular panels are arranged not parallel, but *transversely*, to the direction of the prisms. The details of this form of construction are shown in Fig. 4, *A* and *B*, while the *modus operandi* is best observed in Fig. 5, *A* and *B*.

The radical difference in the operation of this form of light-projecting glass and that of both forms previously described resides in the fact that the light distribution in this form is exaggerated in the lateral as well as in the vertical plane. This feature is illustrated in Fig. 5 *B*, in which *B* is supposed to be a section of the prismatic glass taken on the line *c d*, from an inspection of which it will be manifest that the vertical arrangement of the exterior lenticular panels will serve a similar purpose in this construction in relation to the light falling sidewise on the exterior surface of the glass as the lenticular panels in the previous case serve in relation to vertical rays; namely, to arrest and refract into the dark interior a considerable amount of light in the horizontal plane which would otherwise be lost for useful purposes. All of the light thus collected and introduced into the dark interior by the lateral collecting action of this device is so much clear gain over the devices previously described.

Further consideration will show, also, that if the interior surface of the glass be provided with prisms of uniform angle, determined in each case by the length of the apartment to be illuminated, this form of construction will secure the same advantage in respect of the vertical diffusion of the entering light as will be obtained

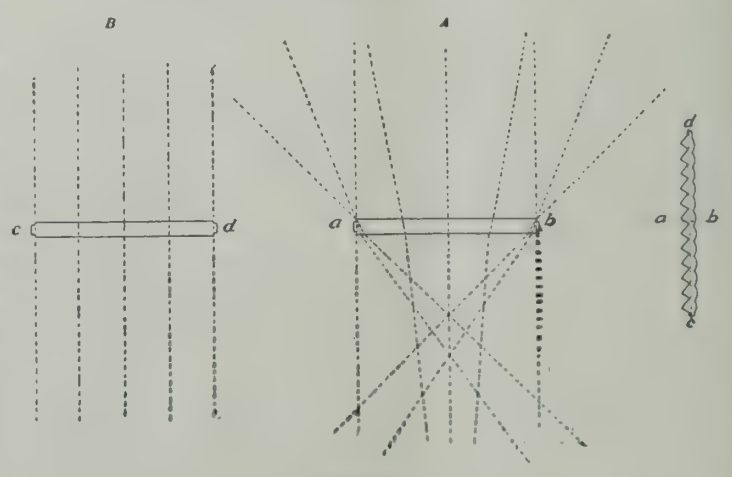


FIG. 3.

from the lenticular prismatic construction previously described.

On theoretical grounds, therefore, the last-described modification of light-projecting glass, belonging to class 2, should give the best results if intelligently installed. Comparative practical tests also bear out this conclusion.

An additional and important advantage possessed by prism glass of the last-named construction (namely, a prism plate constructed with prisms on one side and prisms or lens panels arranged transversely on the reverse side) remains to be noticed.

Since all illumination by means of prism glass is thrown from a comparatively low point, namely, through windows, while all other artificial illumination is directed

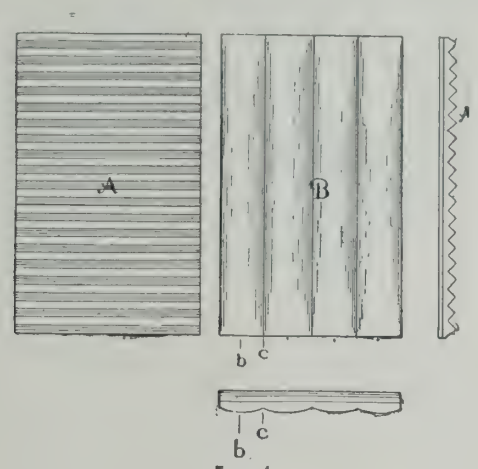


FIG. 4.

from a point above, the shadows produced by the prisms on objects in a room constitute a disadvantage common to most systems of lighting by means of prisms, as has been noticed in what has preceded. The light-projecting glass last described, however, by reason of its diffusing quality, both in the horizontal and vertical planes, largely overcomes this objection. Where two such prism windows are used for the same apartment, the light thrown from one window completely overlaps that thrown from the other, thereby practically obliterating the shadows produced by prism lights of other constructions.

This construction also has the advantage of enabling manufacturers to produce more readily the larger sizes of prisms, from the fact that one surface has projections at right angles to projections on the reverse side, giving a bridge effect, thus adding to the strength of the plate.

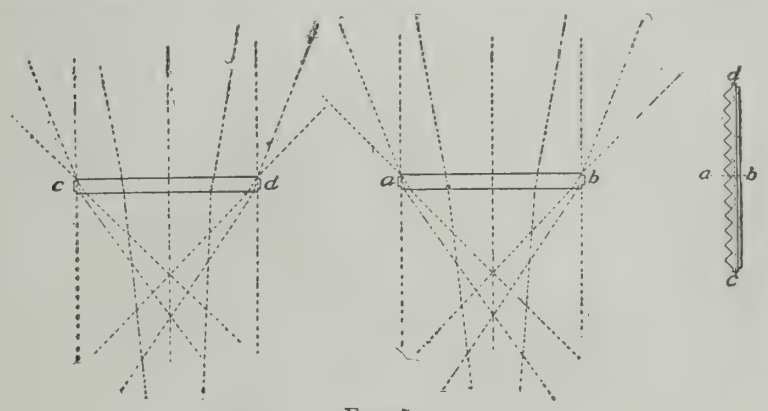


FIG. 5.

For this reason, likewise, it is not essential to have the thickness of the body of the glass as great as with other forms; and, inasmuch as there is a larger loss of light through absorption in passing through a thick than a thin medium, the loss of light from this cause may be very much reduced.

Finally, it may be said that all the various forms of light-projecting prismatic glass accomplish, measurably, their intended purpose of considerably increasing the illumination of dark interiors over what would occur without artificial aid. In the selection of the kind of light-projecting glass and the manner of its installation, the user should be guided by the personal observation of the effects produced, rather than by the claims of rival manufacturers.

Bonding of Brick Work.

As bearing upon a subject which is always interesting to members of the building fraternity, we present some extracts from an article on the above-mentioned topic contributed by the well-known architect, Ernest Flagg, to a late issue of the Brickbuilder. After referring to the change in the methods of bricklaying in this country which the next few years are likely to witness by reason of the introduction of the principles of good design, he, among other things, says :

The practice of running up certain walls or parts of walls of a building in advance of others is a practice which should never be tolerated by the architect. It is nevertheless a practice which is so common here that one may say it is the general custom to carry up the walls which are composed entirely of common brick in advance of the ornamental façades, and then to connect the two by means of an abomination in bricklaying called toothings. The workman accustomed to laying up his work without proper bond sees nothing inconsistent or slovenly in such a proceeding. But how can an architect who takes pride in his work permit such practices? They are proceedings which could only be tolerated where pride in good bricklaying is unknown, and that they are common now serves as clearly as anything could to show the present degradation of bricklaying in this country. They are makeshifts, which result from a mistaken notion on the part of the builder that by resorting to them he can hasten the work; but it is evident that the building cannot be enclosed or finished until all the walls are up, and if one part is carried up before the rest nothing is gained.

It needs no argument to demonstrate that the way to build well is to carry up all the walls simultaneously, interlocking all the materials as the work proceeds. To do otherwise involves an unequal distribution of weight on the foundation during the process of building, which should not be tolerated even if it could be done consistently with good bricklaying, but when this is done in connection with the so-called toothings it cannot be too strongly condemned.

In the manufacture of fine grades of brick, our progress during the last twenty-five years has been very rapid, and we now produce them in extraordinary variety and of most excellent quality. Strange to say, this progress in brickmaking has not conduced to progress in bricklaying, but rather the contrary. The fine grades are used only for face work, and our designers, losing sight of the fine effects which might be produced by laying them up in regular bond with the backing, have used them solely as a veneer, independent of the main body of the wall, and adding practically nothing to its strength. They are laid in a sort of running bond, and are tied to the backing at every fifth or sixth course by what is called diagonal bond. That is, their inner corners are clipped off and the corners of common brick laid diagonally on the wall are lapped over the face work, a process as insecure and slovenly as it is ugly, for by this method the outer veneer has little or no connection with the body of the wall, and looks as if it had absolutely none, appearing to be what it is, weak. The writer has often noticed workmen in taking down old buildings—buildings which would be called new anywhere else—remove great slabs of this outer veneer with a crowbar, showing that there was practically no bond between it and the backing. It seems incredible that such unscientific and inartistic methods could take root anywhere to an extent that architects will deliberately specify this sort of thing; but one who observes our progress in other directions must have far too much faith in the future of good art and its handmaiden, good workmanship, among us to believe for a moment that these methods will endure. At present, this way of laying brick, considered very ugly everywhere else, seems to be admired here. It was first adopted through false notions of economy, but we now find it used almost everywhere in buildings where such considerations evidently did not govern, as well as in buildings of the cheaper kind.

With the introduction of the fine grade of bricks we have developed a love for fine joints, and this class of work is laid up with joints so thin as to be of no use constructively, and which rob the work of all character, and give to it a hard, dry, sleek appearance, which can appeal to no artistic instinct. Now and then we find an attempt at Flemish or English bond, doubtless made by some one who has seen and admired the genuine article abroad or in old buildings in this country, but almost all such attempts are sham, for the face is not really bonded to the backing. The headers are not headers, but bats, because the designer cannot bring himself to give up the small fine joints, and to use joints of a size which is necessary to insure good workmanship; with the thin joint retained it is impossible to interlock the face work with the backing. In other words, our brickwork is laid upon the theory that honesty is inconsistent with art. To vary the general monotony sometimes recourse is had to bricks of peculiar shapes, such as the long, narrow, thin bricks called Roman, which do not and could not bond with the backing. Many people think this variety truly artistic. Few seem to realize that the finest and most artistic effects can be produced by simple means, or to understand what needs only to be tried to be proven, that brick of the commonest kind laid up in interesting and logical bonds will produce far finer effects than the most expensive bricks or the craziest shapes that ever were made, if laid up without regard to the rules of common sense.

One has but to try to find how easy it is to devise all sorts of interesting patterns and endless varieties of beautiful wall surfaces by the use of brick of the standard size regularly bonded to and forming an integral part of the body of the wall. The supposed economy of the present methods, like many other thriftless attempts in the same direction not founded on reason, which spring up in new countries, will be found upon examination not to be economical, but the reverse. With a very slight increase in the number of face brick the outer four inches of the wall, now practically useless, can be made to contribute its proportionate share to its strength. Let us make some calculations to show how slight is this increase, and how out of all proportion to it is the saving effected. In New York face brick is generally laid up ten courses to 25 inches, and common bricks nine courses to 2 feet. If the face brick is made to bond with the backing, it, too, will lay up nine courses to 2 feet, or better still, for face brick and backing, nine courses to 25 inches; then 8.64 face bricks and 10.8 common bricks will be required to each square foot of a wall 1 foot thick. By the common method there would be required to accomplish the same result 7.2 face bricks and 13.5 common bricks, so that by the use of 1.44 more face bricks, against which there is a saving of 2.7 common bricks, we obtain a wall which is practically one-third stronger, for the outer four inches is an integral part, whereas in the other case it is a veneer of little or no value as regards strength.

The taste for good workmanship is fortunately a taste very easily acquired; familiarity with it breeds a desire for more, and when the difference between the appearance of good bricklaying and bad bricklaying is once understood, the demand for the former will spread rapidly. There is now urgent need for good manual training schools where young mechanics can be taught good workmanship in bricklaying; or rather, perhaps one should say, there is urgent need that good bricklaying should be taught in the manual training schools which are already established. It ought to be no more expensive to lay up brick in regular bond than by the "every fifth course a header course" system. That it is more expensive to do so is entirely owing to the fact that the bricklayers are unskilled in the art of good bricklaying. They do not know how to lay the regular bonds because they have never been taught, and if they attempt to do it, of course the progress is slow, and time means money. But if the architects would specify work of this character there would soon spring up a demand for skilled workmen, and the mechanics would soon adapt themselves to the new conditions; it would soon be demonstrated that good bricklaying costs no more than bad bricklaying, and the benefit both from the artistic and constructive standpoints would be worth a thousand times the cost of introducing this reform.

In the large Eastern cities there is fast being created a great body of skilled mechanics in almost every line, except bricklaying, that has to do with building. This has come to pass because there has been a demand for fine workmanship, which has been specified regardless of expense. The building up of these industries and the creation of this body of skilled labor has been of incalculable benefit to the country, and is worth a great deal more than it has cost. Bricklaying is the only building industry which seems to have made rather the reverse of progress during this century.—Carpentry and Building.

Anachronisms in Art.

WHEN Shakespeare makes Hector say to his brothers—

> Paris and Troilus, you have both said well,
> And on the cause and question now in hand
> Have glozed, but superficially; not much
> Unlike young men, whom Aristotle thought
> Unfit to hear moral philosophy,

or when he speaks of a statue in a remote age as "a piece many years in doing, and now performed by that rare Italian master, Julio Romano, who, had he himself eternity and could breathe into his work, would beguile Nature of her custom, so perfectly he is her ape," he is commonly supposed in these, as in many other cases, to have been regardless of time through his ignorance of history. It is, however, remarkable that although some of the rival dramatists were jealous of his success, and made many charges against him, they were silent about his flagrant license in dealing with the past. There were scholars enough about the Southwark theatres who would gladly correct chronological errors if they were allowed to share in drinking a bottle of wine, and Shakespeare was too shrewd a man to allow errors to be exhibited which could be avoided on most economical terms. With more justice, apparently, the errors we have referred to could be explained on other grounds. Aristotle was then taken as a generic term that was familiar to the greater part of the audience. It would need some research to discover a moral philosopher who was an authority in Homeric times, and his name would sound strangely to the groundlings. Julio Romano was probably better known in Shakespeare's time than is now supposed. In 1653, when the collection of Charles I. was sold, while the sum of £300 was given for the cartoons of Raphael, Julio's Nativity brought £500, and another piece by him £150. Many of the gentlemen who witnessed the performance of the "Winter's Tale" may have admired the painter's works, and, as he stood high in favor with the Gonzaga family, it would for the moment appear natural that he was esteemed in Sicily. It is well to remember when criticising Shakespeare that his plays were

like modern pantomimes and burlesques, and were composed for the use of the performers alone. They were intended to move audiences through their ears, and not to be read with care or scrutinized in each line. So long as effect was gained slight errors gave no trouble to a dramatist. We have no wish, however, to defend the manner of writing employed in the plays. If there are anachronisms in Shakespeare's works, he erred in common with so many artists as to give ground for the supposition that time and place were occasionally ignored out of deliberate perversity. There seemed to be a fascination for bringing past and present together as if to exemplify the theory of the Eternal Now. Emphasis was gained in that way, as when it is suggested that the dust of Alexander might be stopping a beer barrel or a part of Cæsar patching a hole in a wall. Shakespeare could maintain that he had as much right to make the past subservient to his needs as any of the great masters of painting, but there were no sticklers in those days for rigid accuracy in any branch of learning or science that was introduced on the stage.

If historical accuracy were then compulsory, many of the noblest pictures would not exist. In the sixteenth century Paul Veronese, who was one of Shakespeare's contemporaries, painted the Marriage of Cana, of which one example is in the Louvre. As an illustration of the text of the New Testament it is valueless. The architecture and the costumes we admire in it were unknown to the people of Cana. How the Hebrew peasants would have stared at the sight of Titian in his deep crimson gown performing on a violoncello, or Paul Veronese playing a viol, or his brother, the architect, in a lovely silk tunic enjoying a glass of the miraculous wine! Many of the kings, princes, and princesses of Europe also appear among the guests, and, as if to add piquancy to the contrast between the original ceremony and the representation of it, the malicious Aretino is introduced as the steward of the feast. Truth is violated to an extent far beyond the anachronisms of Shakespeare when he referred to ancient events. Veronese repeatedly erred in treating Scripture scenes with similar indifference. He was summoned before the Inquisition to account for his irregularities in representing Scriptural events, and especially in a picture of The Last Supper. The only excuse he was able to give was that when he saw blank spaces on his canvas he could not help filling them with figures, although they might have no relation with the subject. He insisted on a similar privilege when treating secular history. The fine Family of Darius at the Feet of Alexander, which is in the National Gallery, is no more than a travesty of the scene as it occurred. Alexander and his generals did not wear such costumes as we see on the canvas, and the bodices and Venetian gowns of the ladies would never have suited an Eastern clime. Titian was no less free in his interpretations. His Supper at Emmaus, which is in the Louvre, contains figures of Charles V., his son Philip, his confessor, and a cardinal, as if they were the favored disciples. Bassano, unlike Veronese, instead of exalting Biblical characters by clothing them in the richest stuffs that Venice could produce, appears to have anticipated some modern French artists by representing the figures in his pictures as if they belonged to the humblest classes around him. They come nearer to reality than the stately figures of the majority of the Venetian painters, but they are manifestly Italian peasants.

Although the Venetians were supposed to have departed further from truth than other painters, it must not be supposed that any school of Italy was entirely free from anachronisms. By what other name can we describe the introduction of Charon the Ferryman in Michel Angelo's Last Judgment? Raphael, who endeavored to become acquainted with the past, and who had marvelous vision for the realization of antiquity, could not resist the temptation of occasionally playing with history as with time and place. In his latest work, The Transfiguration, he did not hesitate to introduce a figure in the upper part of the picture that is not warranted by any authority, and is so inapposite it is usually omitted by engravers. The School of Athens mainly consists of portraits of the painter's friends. In the latter picture he has also adopted two points of view, one for the figures, the other for the architecture, which as a defiance of an accepted law of æsthetics is as criminal as any indifference to chronology. His Attala and Pope Leo is a compliment to his patrons Julius II. and Leo X. rather than a representation of a historic event. But it enabled Raphael to show his esteem for his master Perugino, the Count Castiglione, and the Cardinal del Monte by introducing their portraits. The great painter was well aware of his departures from truth, but if it were necessary he could have found arguments to justify what he had done.

The fact is that from a very early time painters were compelled to bring the present into connection with the past. The people who commissioned pictures for their oratories were eager to be depicted before their patron saints, or they sometimes wished to show their patrons adoring Christ. In that way precedents were formed for the numerous anachronisms which are found in the works of so many schools of painting. It has continued to comparatively modern times, for Le Brun was courageous enough toward the close of the seventeenth century to introduce Louis XIV. in his tallest wig holding a corner of the winding-sheet of Our Saviour.

If all the pictures by Dutch and Flemish artists which contain anachronisms were to be set aside, the two schools would vanish, and as much could be said about masters of the early German schools. With all those painters there was evidently a desire to make men realize that human nature was much the same in all countries, and as the Bible could be translated into their languages and appear as if specially addressed to them, so the difference between them and the Jews was merely one of raiment. Occasionally a great genius, like Rembrandt, arose who represented the scenes as if they were inspired by pure imagination. An event may be painted by him at one time as if it occurred in the poorest quarter of Amsterdam, and at another time as if it were peculiar to some Eastern city where everything was gorgeous. There are etchings by him, such as the Death of the Blessed Virgin, which surpass anything imagined by Paul Veronese. But generally the endeavor was to reduce the ancient records, as it were, to a modern equation, and in that way to bring them home to the Dutchmen's bosoms.

Anachronisms in architecture can not rightly be judged on the same grounds as those of paintings or sculpture. The connection between forms and a particular period is created by the association principle in the human mind. Greek forms are not necessarily confined to Athens, and the arch can be useful in other places outside Rome. Some day or another it may be discovered that the forms should be confined to the places where they originated, and that every land is bound to create a style of its own, which would be possible if foreign examples were prohibited. But a system has been set up and universally accepted by which the adoption of one set of forms and the avoiding of others become imperative. Many great architects have rebelled against the imposition. Inigo Jones, having had experience of Italian ways, did not hesitate to ignore mediæval forms when he was called in to erect a porch for Old St. Paul's. The Gothic builders also insisted on introducing the style which was in vogue when they lived, regardless of the difference between it and the preceding style in any building which they had agreed to alter. There are very few old buildings consequently which have been in continual use that can be considered as entirely "pure," and in some cases there is a medley of styles which modern censors condemn. It might even be said that the real anachronisms in architecture are the attempts to make modern work appear as if it were ancient, and there is more attraction in experiments like those we see in some French châteaux or churches, in which later forms are adapted to earlier arrangements, than in the mere imitation of old work. The fine church of St. Eustache, in Paris, becomes interesting on that account, for it reveals the intellectual effort required to reconcile Renaissance forms with Gothic traditions. It is preferable to any attempt to reproduce Notre-Dame or one of the provincial cathedrals on a limited site. Strictly speaking, the building is "neither one thing nor the other," if we may be allowed to use a popular phrase. But it exhibits the difficulty of showing reverence for the past while being inspired by the present—a difficulty which has given rise to the majority of anachronisms in art.—The Architect and Contract Reporter.

An Old-Fashioned Garden.

Old-fashioned gardens, like old-fashioned garbs, while characterized by a certain family resemblance, have nevertheless the charm of individuality. This can not be said of the grounds of the modern summer house. One has somewhat the same feeling toward the man who entrusts the laying out of his grounds entirely to the landscape gardener as for the merchant who builds a fine house and gives the contract for the furnishing of his library to the architect. The man who can not select his own books will get very little use from his library, and the man who has nothing to say as to the laying out of his grounds will not enjoy them very much, to say the least. What is more monotonous than to go through the grounds of the rich and read the mind of the same landscape gardener impressed upon each succeeding lawn and garden?

Give me, then, the old-fashioned garden, planned, planted, and pruned by its owner, betraying his idiosyncrasies as well as writing large in glowing colors his virtues, tastes, and affections. The owner and maker of the old-fashioned garden of which I write I never saw and know little about, but I read as in an open book his love of beauty, his excellent judgment, his kindly heart. Why, else, did he plant so many roses, select with such admirable care the spot where each thing would thrive best, sun for the sun-loving, shade for the sensitive? Why did he blend with such wise consideration fruit-bearers and flower-bearers, the ornamental and the useful, making this old garden for generations to come a melody and a delight? A methodical man he was—I am sure of that every time I pass between the straight rows of currant bushes—generous, too, for the rows are long. A nature-lover and fond of quietude and seclusion he must have been, I say to myself, as I scan the high board fence surrounding the garden, and an economist, too, I add, as often as I turn up one of the old bones which he has strewn so plentifully through the soil.

Beautiful and significant it is that Nature preserves and perpetuates the cares and labors and loves of one generation, carries them on to the next, and fulfils the cherished design long after the hand that executed it is motionless and cold. How much my predecessor expected to eat of the fruit of this sapling and to pluck of the flowers of this shrub, when, walking close to the verge of life, he thrust death aside and planted them, I do not know, but in his mind there must have dwelt the thought, "If I am gone before these come to flower or fruitage, then at least another will enter into my labors and rejoice in them."

Whether such thoughts were in the old man's heart or not I am sure he would not repent him of his pains could he see the fair-haired little girl who now trips with fairy steps between the enclosing currant bushes and reaches up on tiptoe to glean from the high old-fashioned rose bushes their treasures of red and pink and white; or when the brave old cherry tree that never fails bursts into fragrant bloom and hastens to hang out its luscious largess to the unmixed delight of all the household; surely, if he who set out this treasure tree could witness the festivity that centres about it annually he would be moved to think that he was able to contribute so much to the joy of his fellow-mortals.

The old garden is admirably arranged with respect to the succession of its delights. The procession of the flowers moves on past the old bench under the cherry tree which serves as our reviewing stand, and we gaze upon it with unflagging admiration. The white company of *Narcissus poeticus* leads, then follow the plumed lilacs, white and purple; the beautiful snowballs, the modest lilies of the valley hanging their heads, the gorgeous pink peonies, the wygelias in crowded ranks; then the graceful deutzias, next the glorious array of roses, followed by the later and finer peonies, then the morning-glories, day lilies, trumpet flowers, and so on, the great battalion of the flox bringing up the rear. It is seldom that a gap occurs, and when it does the order to close up the ranks is quickly given and heeded.

Although I have walked about the paths of the old garden, and marked well her adornments for nearly nine years, I am continually finding something new and strange. One summer there appeared in one of my new-fangled flower-beds an interloper who, upon disclosing his identity with no little show of pride, proved to be an African hibiscus. Not long ago, as I was poking about in the wilderness of witch grass which has taken unchallenged possession of certain more remote corners of the garden, I discovered one of those curious old turk's-cap lilies trying to hold his own against his thick-encompassing foes with the crown of victory upon his emaciated brow. I will give him an open field next year as a reward for his courage. And the other day, when I had painfully uprooted and cast away a ragged-looking bush growing close to the side of the house, I was informed that I had consigned to Gehenna a Japanese quince. One of the oddest plants in the garden, to my unaccustomed eye, is one with stiff dark leaves, from which curl strings of thin fibre and which in late summer sends up a towering stock crowned with singular, colorless flowers of bell shape. The only name for this that I could secure from my friend who fell heir to the old garden, and who is far from being a botanist, was: "That, sir, is euchre." I was euchred indeed until I finally discovered that this floral curiosity was the Californian yucca, common enough, I suppose, to many, but strange to me.

Contrary to the general rule, my old-fashioned garden has no box borders. Of this, however, I am heartily glad. My neighbors may have the box and welcome; for, while there is a certain stately dignity about box that consorts well with the past, it is unduly sombre. It expresses that element of enforced gravity and solemnity which is the least attractive feature of old-fashioned New England life. Besides, I prefer the delicious fragrance of the old strawberry bush that breaks the monotony of Currant Row with its stiff straggling branches and dusky red blossoms. Pinch a leaf and tell me if anything could be more exquisite and refined than this, or more suggestive of the spicy New England character.

But, although my old-fashioned garden does not boast the stately box, it is well furnished with another and more desirable possession, without which no old garden, at least in Salem, is worthy the name, and that is the pear tree. As the reformed pirates took to knitting, so the retired Salem shipmasters—why I do not know—found a resource in their leisure in raising pears. Cargoes as rich and rare as any they brought into Salem harbor did they stow away in the late autumn days in their ample closets and pantries, gathered from the boughs of their famous pear trees. As a consequence Salem gardens revel in pears, and mine, though not owned by a shipmaster, is not without pears in whose lusciousness is concentrated the richest wine of summer and the finest flavor that Mother Nature can concoct in her marvelous underground distilleries.—John Wright Buckham in The Evening Post.

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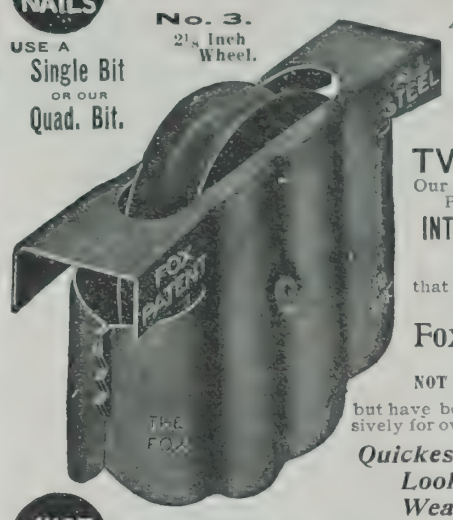

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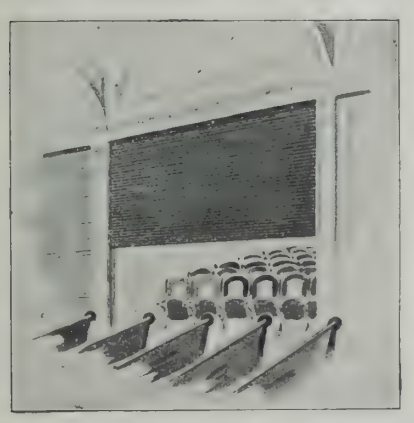

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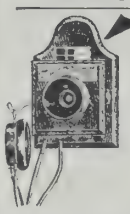

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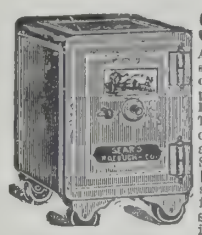

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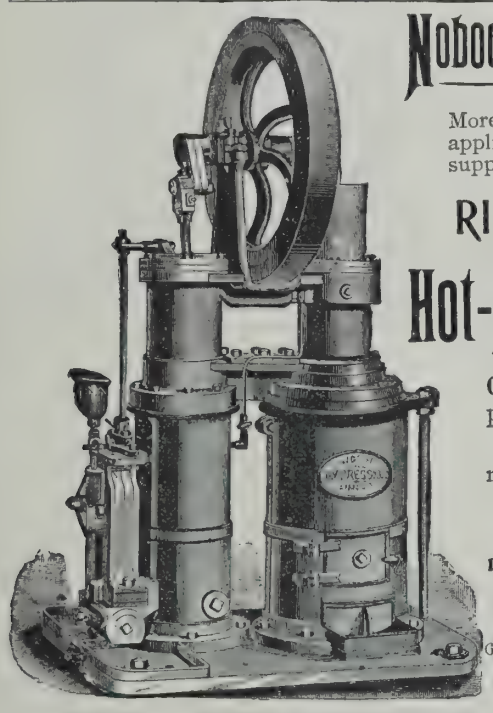

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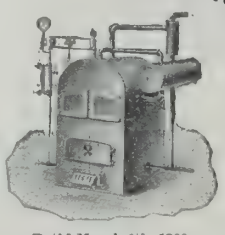

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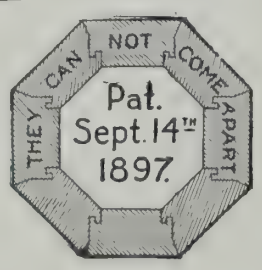

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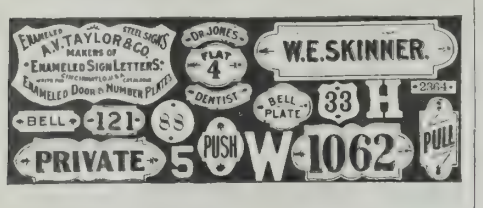

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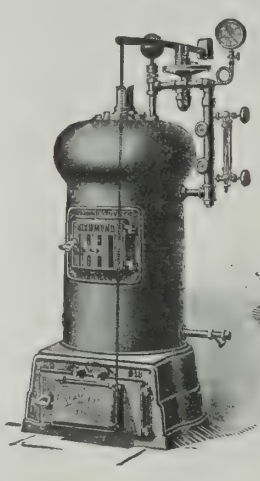

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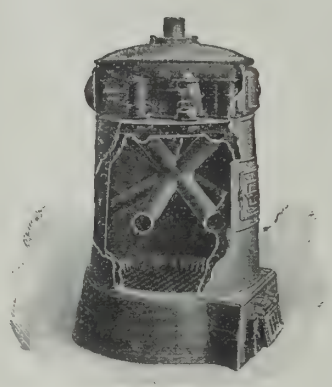

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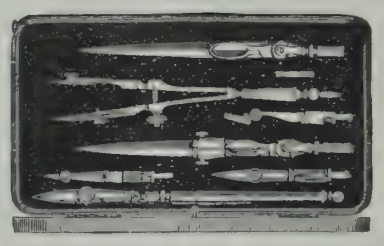

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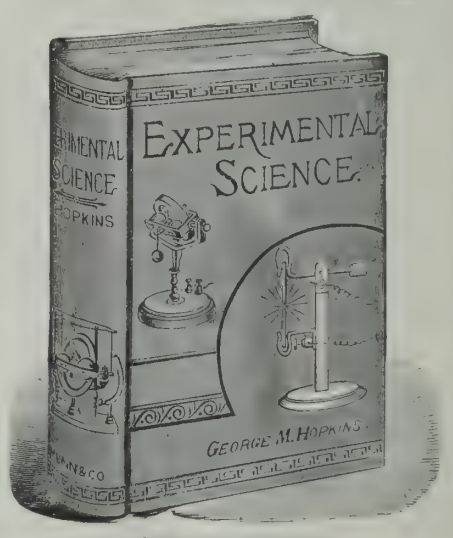

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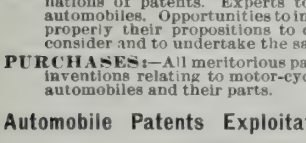

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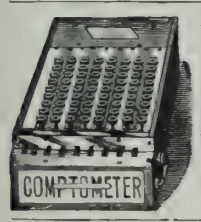

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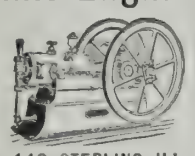

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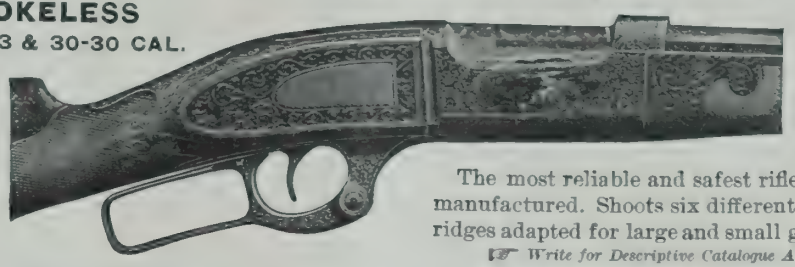

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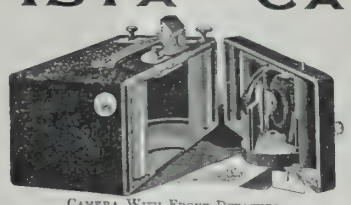

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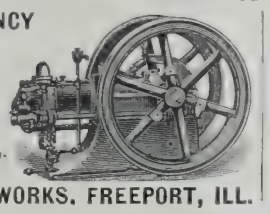

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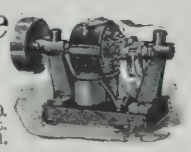

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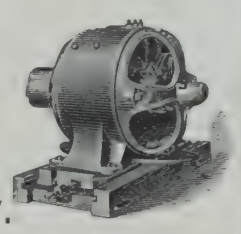

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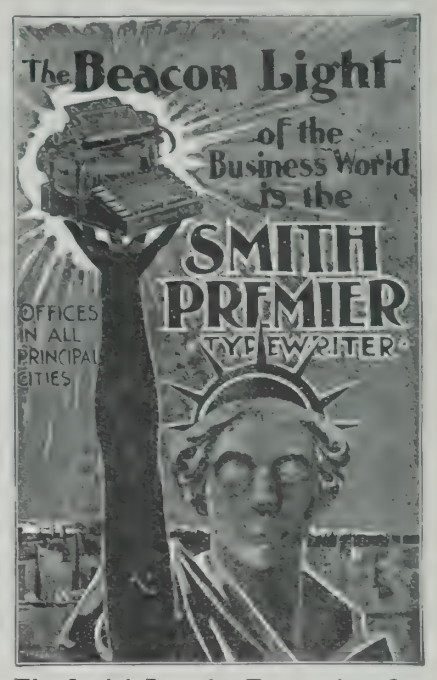

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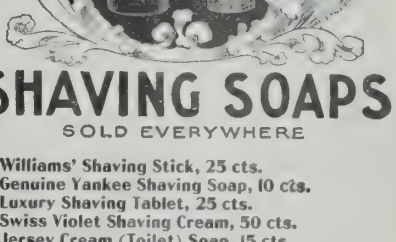

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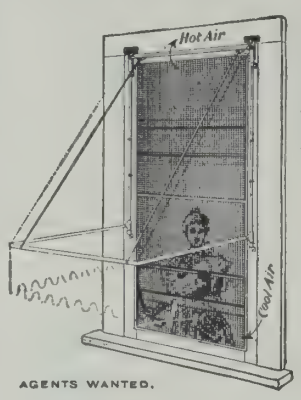

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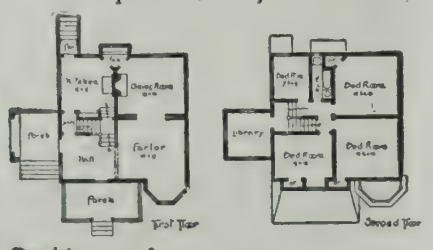

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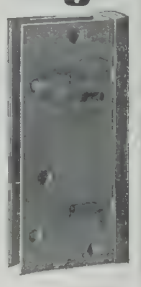

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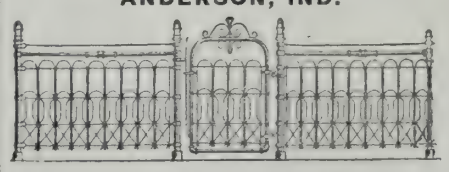

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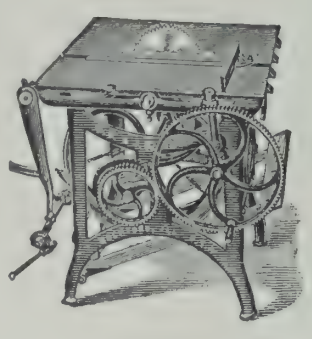

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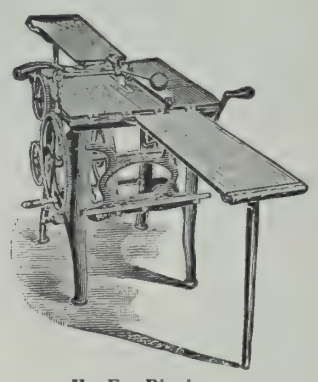

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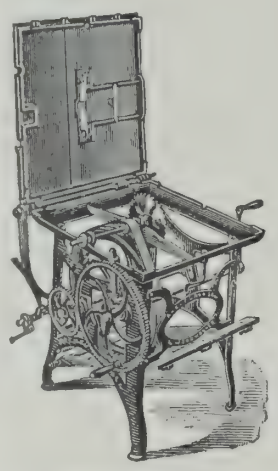

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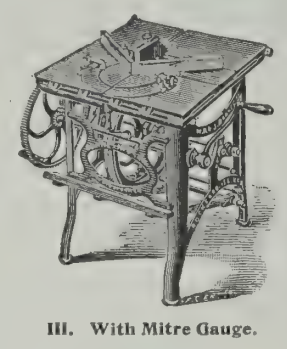

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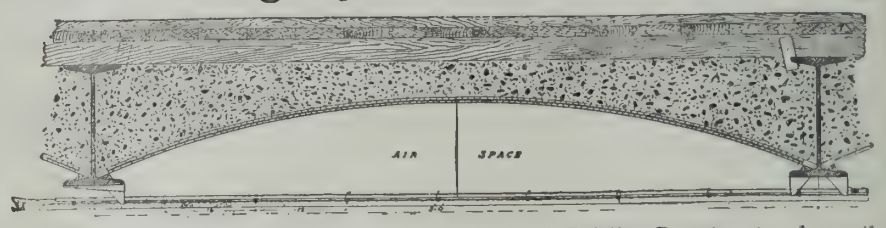

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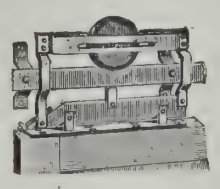

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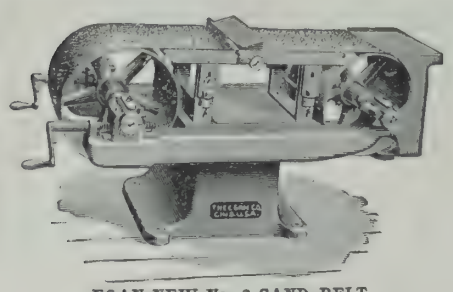

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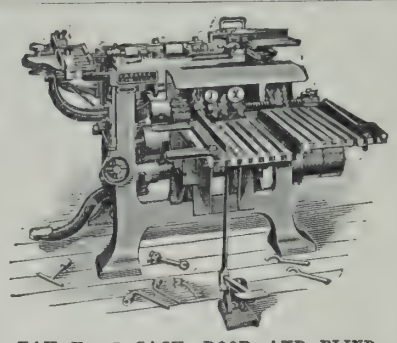

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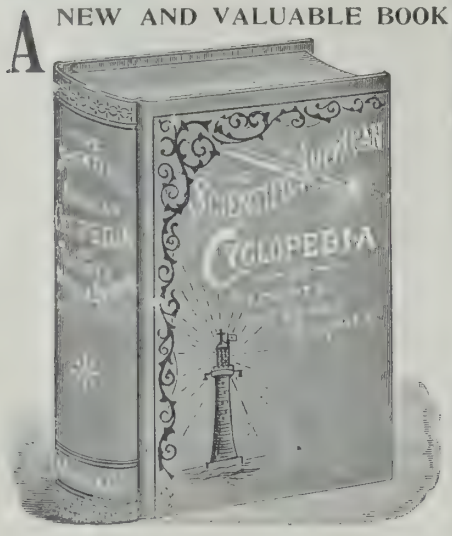

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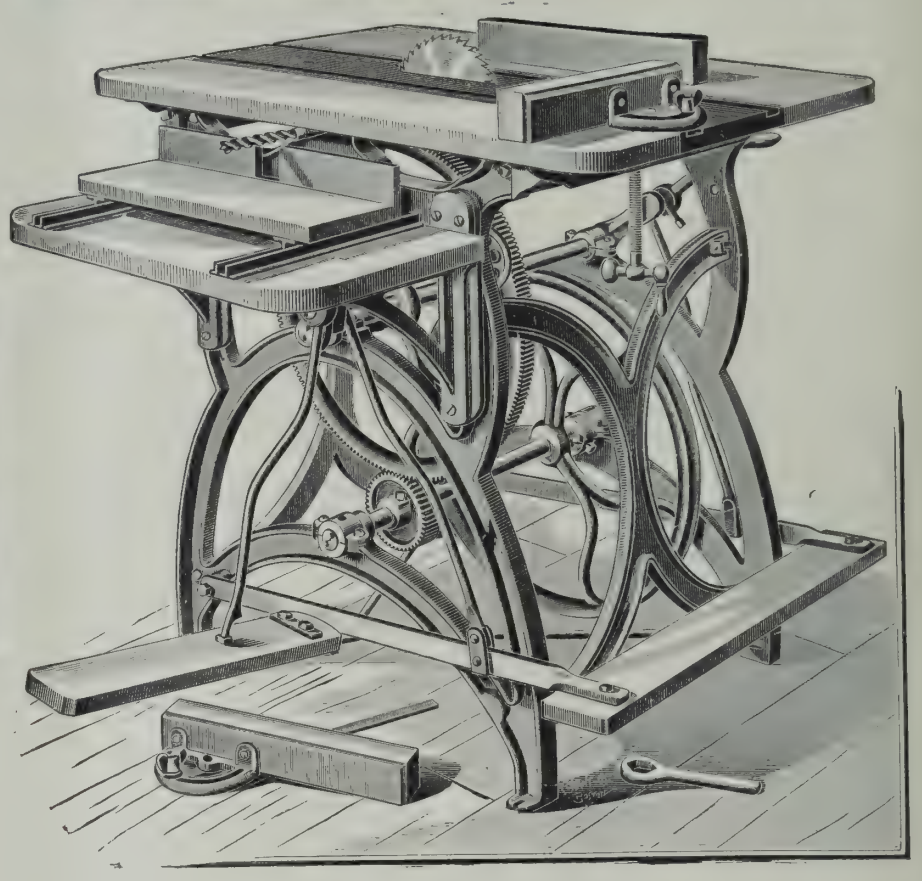

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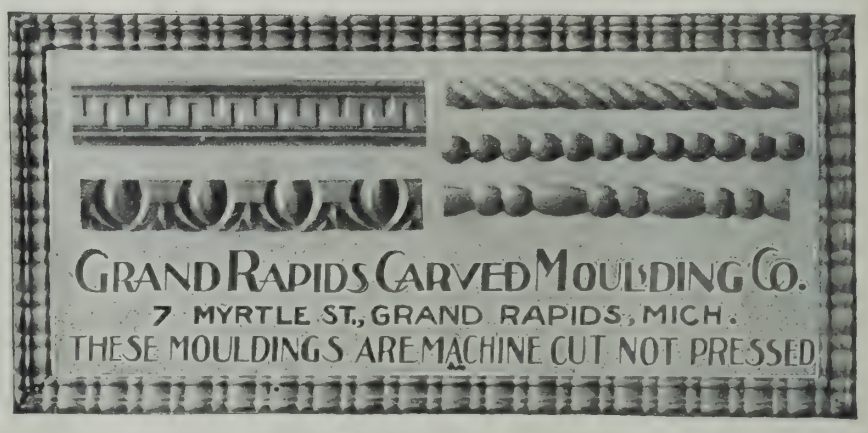

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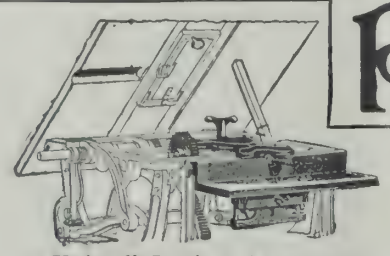

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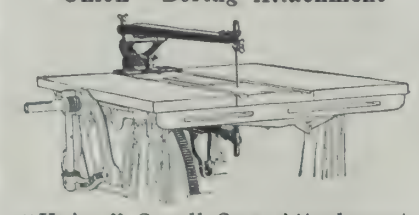

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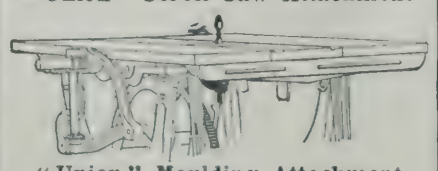

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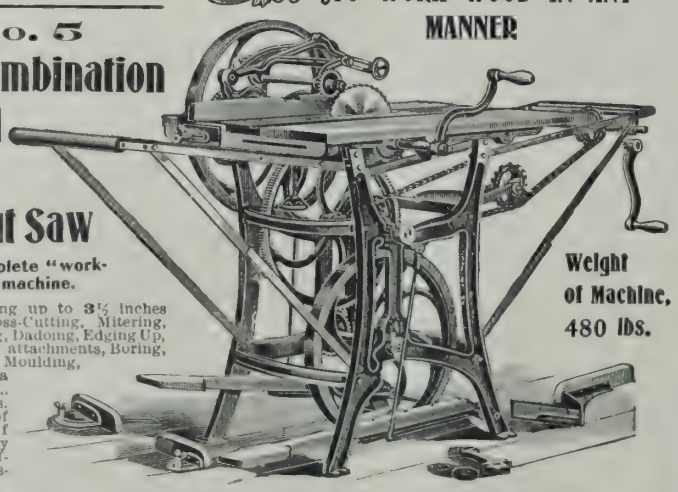

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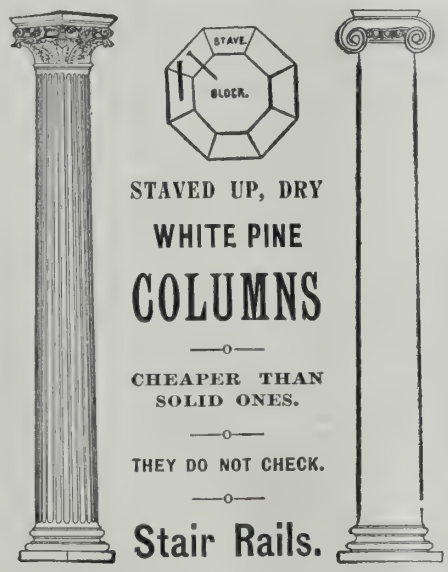

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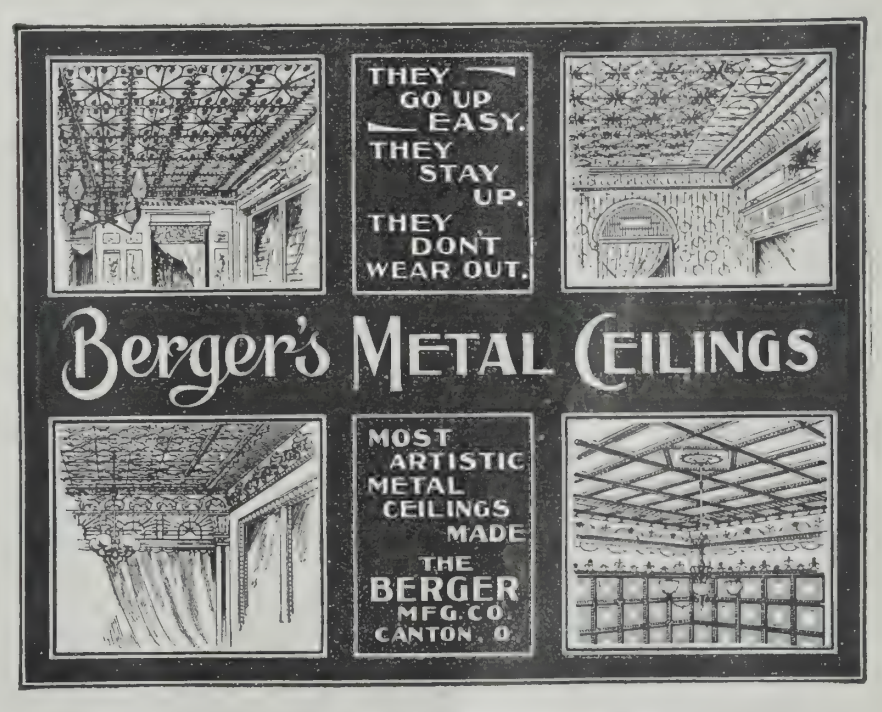

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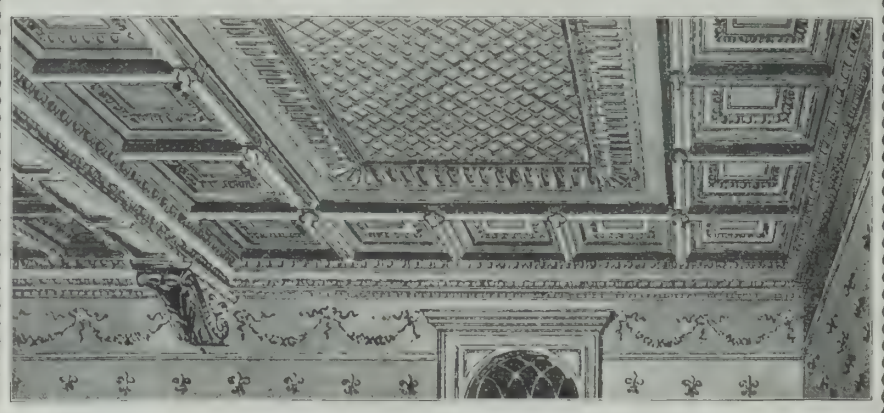

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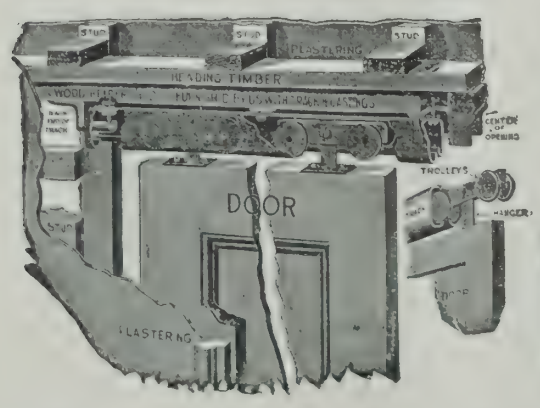

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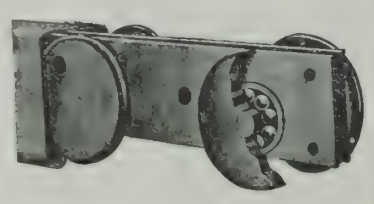

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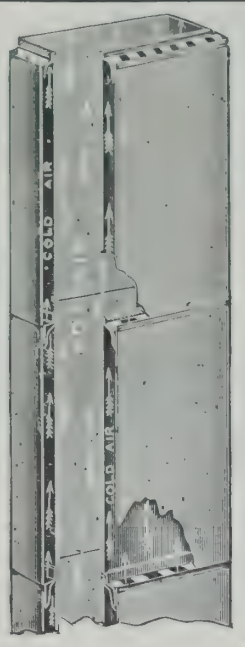

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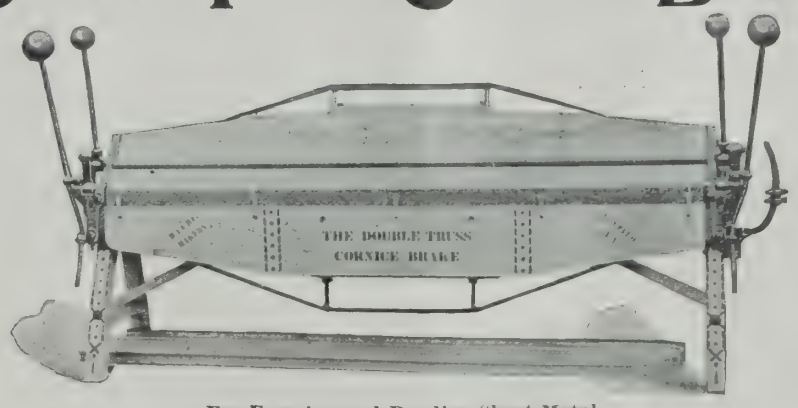

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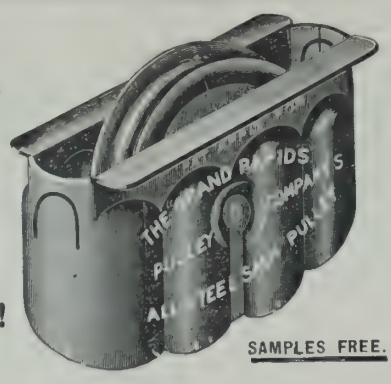

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THE ARCHITECTURAL ANNUAL.

THE Architectural Annual, published under the auspices of the Architectural League of America, and edited by Albert Kelsey, is a sumptuous quarto volume filled with valuable reading matter and splendidly illustrated. It is a worthy production, which merits the support, not only of architects, but of the public as well. It is safe to say that never before in such compass has the same amount of information been conveyed, and we shall deal with a few of the subjects of which it treats.

The Cleveland Convention of The Architectural League of America is destined to work great good to the architectural profession. Scattered clubs of artists and sculptors have founded federations which have proved of great benefit to the societies at large, and the League was formed in the same way, and now eleven clubs and leagues are in the association. No attempt has been made to embrace every society, but they will be welcome when they decide to apply for admission. We have given in our last issue some of the papers which were read at the Cleveland Convention. The League manifested a keen interest in municipal adornment, and placed at the service of any community the knowledge in the League's possession. In determining its attitude toward the profession the Convention emphatically declared itself opposed to political preferment in competitions, and it decided to be energetic, active, and fearless in revealing the existence of such. For this reason alone the League would have demonstrated its right to exist. Toward the profession as a whole, the League stimulated thought along broader lines, and called attention to the necessity for worthy ideals and higher standards. There was a time when the profession was disorganized, and possessed of mercenary ambitions, but a few workers strove incessantly to give the architect a real standing. Finally, their efforts were crowned with success, and the world at large is not encouraging the profession, but the hard-earned prestige is threatened by scandals and by work for unremunerative commissions; the League has sternly set its face against such practices.

Architecture as a business, architecture as a profession, and architecture as an art, are not synonymous terms. As a business it involves building, as a profession it has to do with designing and building, and as an art it includes the former elements and becomes a vehicle of thought. With few exceptions, until five or ten years ago, architecture in the United States was but a business; now it is a recognized profession, although some of its members are not inaptly called by the Architectural Annual nothing more than unscrupulous business men. Signs are not wanting in that higher type of development in which art and intellectuality vitalize and add soul to the design. As a business, architecture is ground out like any other commercial product, being paid for on a competitive basis, the lowest bidder being frequently retained. As a profession, a certain standard of excellence is aimed at, and uniform charges prevail. As an art, it becomes a matter of individual talent, far removed from competitive business, and in consequence, like the art of a portrait painter, the great architect must receive a special price for his services. Year by year these classifications become more and more distinct, and the professional man and the specialist receive more and more patronage, and it is to them we must look for the advancement of architecture. It is gratifying to note the advance in architectural design, but such advance seems to have been more amazing when the present state of architecture is considered. An architect is now paid, not in proportion to the excellence of his design, the watchfulness of his superintendence, or the conscientious effort on his part to minimize expense, but in proportion to the entire cost of his work. This has encouraged the structural steel companies to include in their bids the service of an engineer who works out the construction, and has enabled terra-cotta companies to make detailed drawings from small scale sketches, without apparently charging either architect or owner for them. In extreme cases it has led to bribery and corruption. When old city residences are considered, which have been built on the same plans, with the same simple detail drawings, the architect's five per cent. commission was commensurate with his labor; now, however, homes for the same class of people need entirely separate designs, very varied material, complicated mechanical plants, and peculiarly individual requirements. The office expenses of the architect are more than double for this class of work, but still people expect to procure good architectural service on the commission of past generations. Some grudgingly pay six or seven per cent., but eight per cent. upon the total cost of a thoroughly well-designed and superintended private residence is only a fair compensation for an architect.

A promising sign of the advance in the profession is the unanimous decision by its better element that open, unlimited competitions are demoralizing, and unusually productive of most unsatisfactory results. Most of these support their belief by refraining from participating in unpaid and unlimited contests. This is greatly to be commended. Competitions by invitation or by limited invitation are becoming general among intelligent people.

Efforts are being put forth to form an ecclesiastical architectural society. Church architecture has been sadly neglected of late, and it is to be hoped that such an organization will speedily be formed. The municipal art movement is producing tangible results. In some of the projects for the monumental treatment of American bridges this movement is plainly shown.

The advance in the standard of scholarship is noticeable, and the traveling scholarships of Cornell University and the University of Pennsylvania, and the Rotch traveling scholarship, are steps in the right direction. A technical education of high calibre is now demanded of every architect just as it is demanded of other professions. The outcome has been the success of those technically trained, or the necessity for some of the older architects to hire such men because their own training is insufficient to cope with present day problems. Since the fall of 1897 an Illinois law has required architects to apply for a license to practice in that State, and when the licensing of architects is made compulsory, we may hope for the brightest accomplishments in an unhampered profession.

The Annual then refers to a minister of fine arts, municipal art, a circuit of architectural exhibitions, architectural clubs, catalogues, international expositions as epoch markers, and architectural libraries. Finally it considers that there has long been lacking a ground of common interest for the expression of clients' needs and the architects' ideals, and it has remained for the Architectural Annual in its unique position to strike the chord that will bring into harmony these apparently diverse elements. It is a popular book of reference, suited by its universality to the library shelf of professional and laymen alike.

THE LADY CHAPEL FOR ST. PATRICK'S CATHEDRAL.

ST. PATRICK'S CATHEDRAL, New York City, will have a Lady Chapel. Professor Ware, of Columbia University, furnished the competitors with outline drawings of the present Cathedral, printed in light gray ink on drawing paper, so that the architects would have little difficulty in drawing in the Lady Chapel. The successful competitor was Charles T. Mathews, of New York City. Fourteen designs were submitted. The estimates varied from $200,000 to $400,000.

A MODERN TWO-FAMILY FLAT-HOUSE, AT ALBANY, N. Y.

WE present herewith, on page 49, in this issue, a modern two-family flat-house, which has been erected for Miss Kate Shaffer, at Albany, N. Y. This building has many attractive features, including separate entrances and porch for each family, both front and rear, bay windows, balconies, and gambrel roof. The underpinning is built of red brick, laid up in red mortar. The exterior is covered with sheathing, paper, and clapboards, and then painted Colonial red, with ivory white trimmings. The roof is covered with slate. Dimensions: Front, 38 ft.; side, 65 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 9 ft.; third, 8 ft. The building is arranged in the most complete manner for the use of two families, and is intended to meet the increasing demand on the part of those who desire to own their home, but feel unable to bear the burden of expense entailed by a house from which there is no income. In a house of this class, one flat being rented, brings in sufficient income to enable the owner occupying the other flat virtually rent free. Each flat contains a large reception hall, parlor, dining-room, library, kitchen, butler's pantry, sitting-room, with two chambers on first story and three chambers on second story, and an extra chamber on third floor for each family. The trimming throughout is of white poplar filled and varnished. The hall on first story has ornamental columned arches, separating reception room from hall proper, while the hall leading up to second story contains an ornamental staircase with newel posts, balusters, and rail. The parlors have wooden mantels of handsome design. The libraries and dining-rooms are furnished complete, with closets provided with leaded glass doors, and cluster windows. The kitchens and pantries are wainscoted and furnished with all the best modern conveniences. The rear halls are fitted up with dumb-waiter from cellar to second story, and also a recess for ice-box in each hallway. The bathrooms have wainscoting and J. L. Mott's porcelain fixtures, and exposed nickelplated plumbing. The house is supplied with hot and cold water, is lighted with gas, and heated with a complete steam appliance. It also has electric bells, speaking tubes, and door openers. The third floor contains ample storage room, besides the servant's room for each family. A cemented cellar contains the necessary apartments for each family. A laundry is provided in cellar, with Georgia pine floor, enclosed with pine partition, and fitted up with stone laundry trays, sink, etc., with separate hot water supply from each story, arranged with stop valves, so laundry can be used by each family. The contract price was $6,279.73 complete. Mr. William J. Obermans, architect, Watman Building, Albany, N. Y. The contractors were as follows: Masons, McCafferry & Hughes; carpentry, Richard Wensley; plumbing, Kieley & Stahl; painting, Morris Kantrowitz; roofing, James Ackroyd, all of Albany, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

THE SCOVILLE MEMORIAL LIBRARY, SALISBURY, CONN.

WE present herewith on page 47, in this issue, "The Scoville Memorial Library," which has been recently erected by the family of that name, as a memorial building at Salisbury, Conn. The building is treated in finely executed style of architecture, with a feeling of the Tudor style. One of the chief characteristics is the tower, containing a cathedral clock and bells, which strike in different tones the quarter hours as well as the hours of the day. The building is planned, not simply as a library building, but has also a public hall, with a kitchen and sewing-room in basement, so that it contributes to the pleasure as well as to the cultivation of the people of the picturesque and quaint little town in the northwestern hilly section of the State of Connecticut. It is constructed of rock-faced native limestone, of a soft gray color, harmonizing nicely with the roofs, which are covered with dark slates. The building is 119 feet long, with an average depth of 35 feet, and in addition there is a fireproof rear projection, which is 26 feet by 25 feet, for the book stack, capable of shelving about 33,000 volumes. The main corridor, or entrance hall, is trimmed with antique oak, with floors covered with deep red tiles. The walls and ceilings are covered with crimson panels above the wainscotings. The reference room and also delivery room are trimmed with antique oak, with "Corticene" floors, and walls and ceilings of light shades of color. The card catalogues are to be found on the delivery counter, which is centrally located in the intermediate hallway between the main corridor and the large reading-room, giving the librarian a complete supervision of the entire premises, devoted to library purposes, and ready access to the three-story stack-room which opens from the space behind the counter. It is not the intention to open this stack-room to the public. The reading-room is trimmed with light wood, with "Corticene" floors, and light tints for walls and ceiling. At the end of this reading-room is a large open fireplace, and directly over it is inserted in the wall a piece of carving some six hundred years old, from the cathedral of Salisbury, England, which was sent over to the town by the church authorities in England. The main hall, 39 x 40, is capable of seating on the main floor, and in the gallery, from two to three hundred people. It contains a stage which is ample enough for amateur theatricals or other entertainments, for which it is often used. The halls serve for dancing, fairs, lectures, and is thus a social centre for the town. The building is heated by steam, lighted by gas, and supplied with water. The whole plant and equipment reflects the artistic taste as well as the generosity of the donors. Messrs. Stone, Carpenter & Wilson, architects, 49 Westminster Street, Providence, R. I. Messrs. Isaac N. Bartram, mason, of Sharon, Conn., and Griswold & De Forest, carpenters, of Norwalk, Conn., erected the original building; the addition was constructed by Beers & Trafford, of Millerton, N. Y. The stack room was fitted up with book stacks by J. B. & J. M. Cornell, of New York. The heating apparatus was put in by Wm. E. Cornell, of Lakeville, Conn., the steam boiler being made by the Boynton Furnace Co., of New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

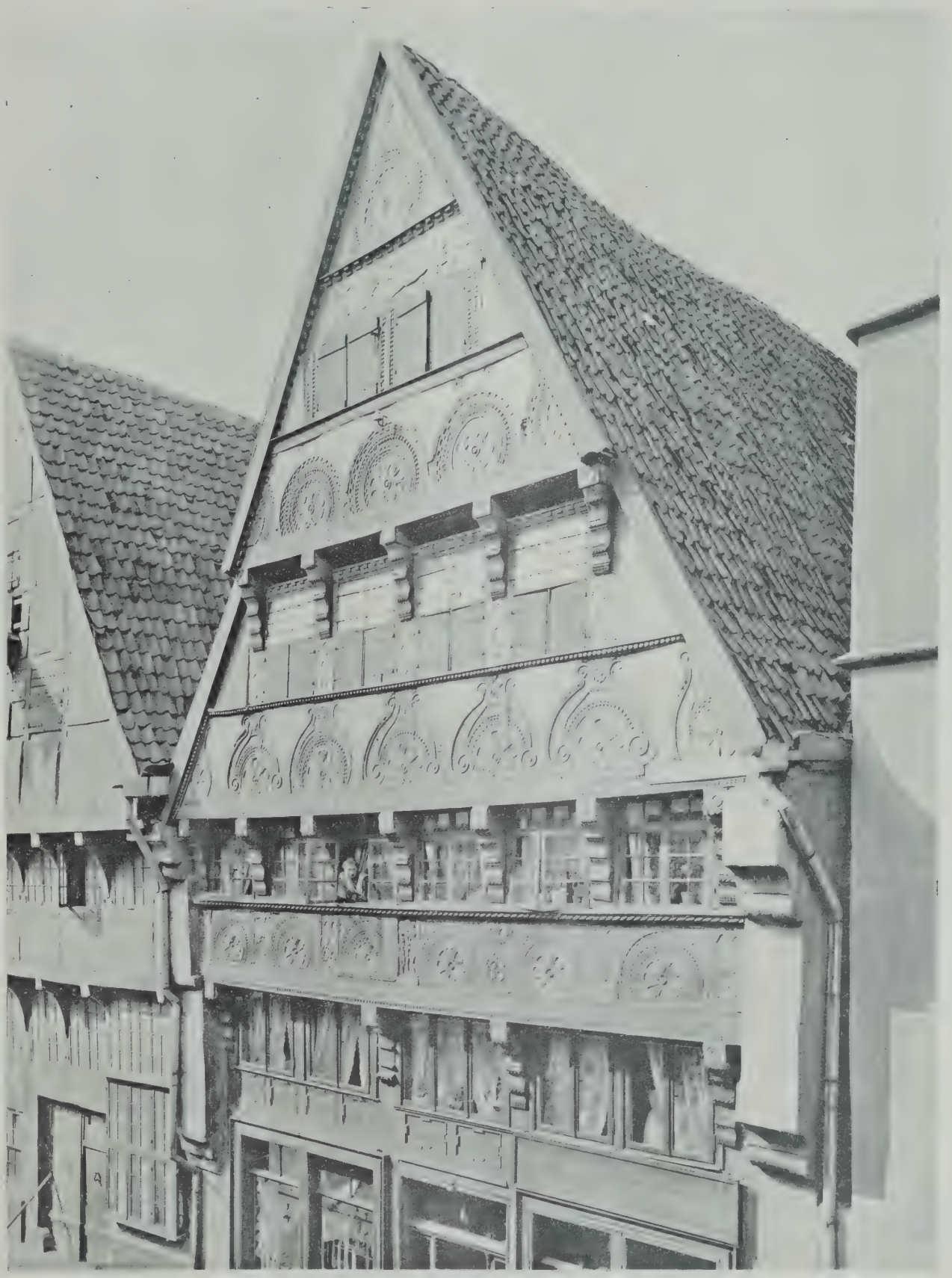
BACK NUMBERS WANTED.

SUBSCRIBERS, or others, having copies of the January, 1900, issue of the BUILDING EDITION which they wish to dispose of will please communicate with the publishers, who are desirous of securing additional copies. A reasonable sum will be paid. Address Munn & Co., 361 Broadway, New York.

A RESIDENCE AT HARTFORD, CONN.

WE present as an illustration on pages 50 and 51, in this issue, a residence which has been erected for Dr. T. B. Enders, at Hartford, Conn. The design is a modern adaptation of the American style, with Dutch feeling. The main architectural features are the "stepping stone" gables, the entrance way with copper balustrades, and the chimneys and chimney pots. The underpinning is built of rock-faced red sandstone. The superstructure is constructed of Roman brick of a dark dull buff color, while the trimmings are of dressed sandstone. The bond courses in gables and arches are made by selecting the lightest colored brick and laying same with level bond with other brick. The cornice and gutters are of copper. The roof is covered with red shingle tiles, harmonizing nicely with the whole color scheme of the building. Dimensions: Front, 65 ft.; side, 68 ft. 4 in., not including terrace. Height of ceilings: Cellar, 8 ft.; first story, 11 ft.; second, 10 ft.; third, 9 ft. The interior arrangement is most excellent. It contains many large rooms and a spacious hall. The vestibule and main hall have red tile floors, tiles twelve inches square. Steps from vestibule to hall proper are of dressed stone. The trim in hall is of selected straight-grained oak, set up with finely sawed finish throughout. It has a paneled wainscoting from floor to top of door casing, the top of wainscot and door casing being level. The whole is finished with a shelf six inches wide running around the entire hall. The main staircase is a grand one, turned out of oak, same as trim, and with carved newels, etc. The hall also contains an attractive nook with paneled seat, and an open fireplace, with tiled facings and hearth, and a Dutch mantel, with large overhanging hood, with wood shingle top extending up to the ceiling line. The parlor is treated in old ivory white and gold, and it contains a very handsome fireplace, with tiled trimmings and mantel. The living-room is trimmed with dark red mahogany. It has massive ceiling beams 6 inches deep and 4 inches wide, boxed 2 feet 6 inches on centres. The spaces between ceiling beams are filled with panels. There is a heavy frieze of mahogany, and each beam is supported at end with neat carved brackets. The fireplace has a tiled hearth and a tiled front, with a neat carved shelf, supported by carved brackets and pilasters. On top of shelf there is a richly carved cabinet, with paneled door and ornamental hinges, and a carved cornice above. The dining-room is trimmed with selected grained red oak. It has a fireplace with tiled hearth and facings, and a mantel of Dutch style, with large overhanging hood, with wood shingle top extending up to ceiling line, and also a beamed ceiling. The office and waiting-room are conveniently arranged and located, are provided with all the best modern fixtures, and finished off in a handsome manner. The butler's pantry is trimmed with white pine, with sink and drip-board, glass china cases, and open shelves. The kitchen is trimmed with white pine treated natural, and it contains all the best modern fixtures complete. Ice box, with outside entrance thereto, is also built in. The floors on first floor are laid of selected quartered white oak, tongued and secret nailed. The second floor contains four bedrooms, large closets, two bathrooms, and a large laboratory, taking in the whole extension wing. The two south bedrooms are trimmed with birch, the northwest bedroom with sycamore, and the east bedroom with cypress. The north bathroom has a Portland cement floor and a wainscoting six feet high, while the south bathroom has a white enameled tile wainscoting five feet in height. Both bathrooms are furnished with porcelain fixtures and exposed nickelplated plumbing. The fireplaces on this floor, where shown, have tiled hearths and facings, and neat wooden mantels to correspond with the trim of each room respectively. The floors are laid with quartered white oak. The third floor contains the servant quarters and ample storage. A cemented cellar contains furnace-room, laundry, and other necessary apartments. Mr. H. Neil Wilson, architect, Pittsfield, Conn. Hill & Fox, of Hartford, Conn., were the general contractors. Messrs. Crosley & L'Hommedieu, of Hartford, Conn., put in the heating apparatus (hot water) and a "Perfect" Richardson & Boynton range. Bradley & Hubbard, of Meriden, Conn., supplied the fireplace, gas, and electric fixtures. Potter & Co., of Springfield, Mass., furnished the mantels.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.



DWELLING HOUSE AT OSNABRÜCK.

AN INTERESTING DWELLING HOUSE AT OSNABRÜCK.

OSNABRÜCK is a prosperous manufacturing town of Prussia, on the road between Rotterdam and Hanover. The older streets are narrow and crooked, and contain many interesting examples of Gothic and Renaissance domestic architecture. The modern houses are substantial, and the old fortifications have been converted into promenades. The house shown in our engraving dates from 1586, and has a picturesque gable overhanging the street. The house really has five stories and an attic. Each story projects further and further over the street, supported on corbels. The broad space between the various floors is carved in conventional patterns. For our engraving we are indebted to the Blätter für Architektur und Kunsthandwerk. Verlag von Richard Bong.

A MODERN DWELLING AT UPPER MONTCLAIR, N. J.

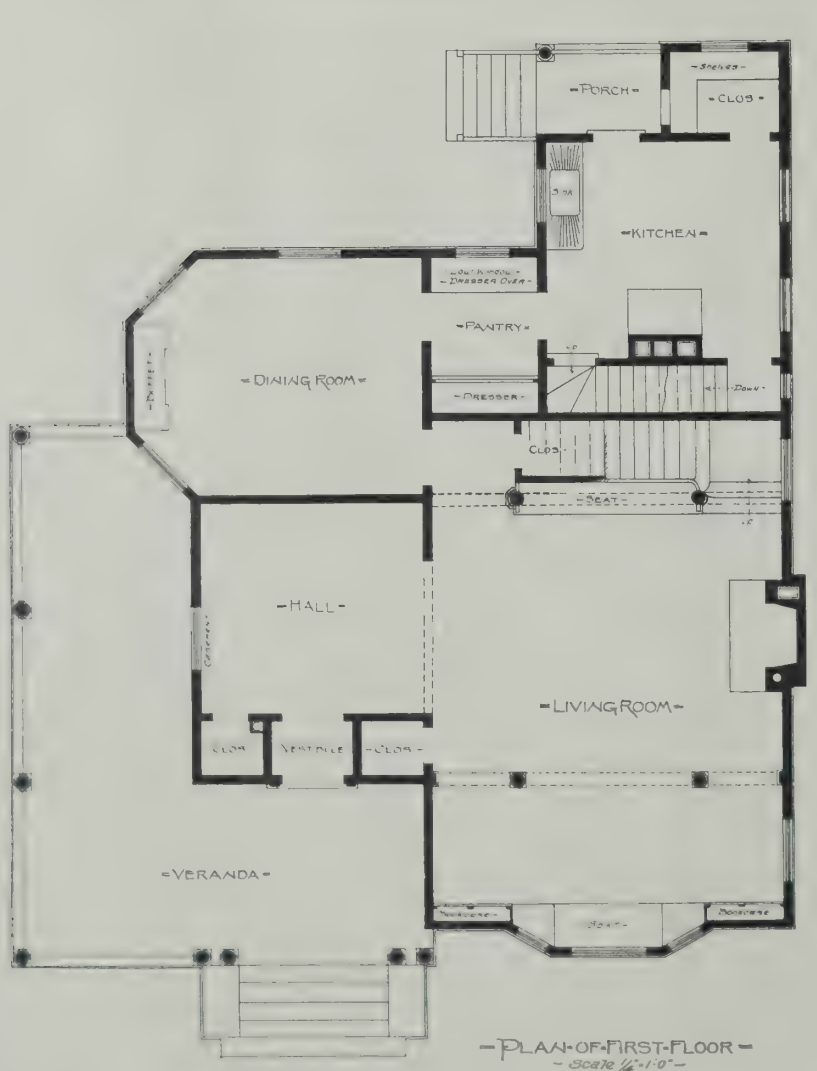
WE present herewith, on page 53, a modern dwelling recently completed for S. C. Smith, Esq., at Upper Montclair, N. J. The design shows an excellent example for a modern dwelling of low cost, which has a combination of good elevations and well arranged plans. The principal features are the piazza, bay-windows, and tower, which add dignity to the whole general effect. The underpinning is built of red brick laid up in white mortar. The exterior framework is covered with sheathing, paper, and the first story is covered with clapboards, and painted yellowish gray, with ivory white trimmings; the second and third stories are covered with shingles and stained a soft brown color. The roof is covered with shingles and finished natural. Dimensions: Front, 30 ft.; side, 40 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft.; third, 8 ft. The hall and parlor are separated by an archway, with column effect, in a very attractive manner. The hall contains an ornamental staircase, with turned balusters, newel, and rail. The sitting-room contains an open fireplace furnished with tile facings, and hearth and mantel of excellent design. The dining-room is treated in a neat manner, and is separated from sitting-room by an archway with columns, thereby throwing the two apartments into one. The kitchen is provided with sink, hearth for range, and a large closet and pantry fitted up complete. The lobby at rear is large enough to admit ice-box. The second floor contains four bedrooms and closets, besides a bathroom, fitted up with the usual fixtures, including porcelain tub, "Atlas" syphon jet, closet, and exposed nickelplated plumbing. A cemented cellar contains an Auburn steam heater, laundry, and other necessary apartments. The contractors were: S. C. Smith, carpenter; Theodore Sigler, mason; Cornelius Halstead, painting, all of Upper Montclair, N. J., and Frederick Fars, plumber, of Montclair, N. J. Mr. S. C. Smith, architect and builder, Upper Montclair, N. J. Cost complete, $3,800.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL RESIDENCE AT ALLENHURST, N. J.

THE engravings shown on page 48, in this issue, illustrate a residence of Colonial treatment, recently erected for Major Henry S. Wright, U. S. A., at Allenhurst, N. J. The lines of the building are square, but the elevations are sufficiently broken by many excellent

(Continued on page 55.)



PLAN OF FIRST FLOOR
Scale 1/4"-1'-0"

PLAN OF SECOND FLOOR
Scale 1/4"-1'-0"

AN ARCHITECT'S HOUSE AT CHESTER HILL, MOUNT VERNON, N. Y.—See page 55.

MESSRS. LOUIS HERBERT LUCAS AND WILLIAM A. CABLE, ARCHITECTS.

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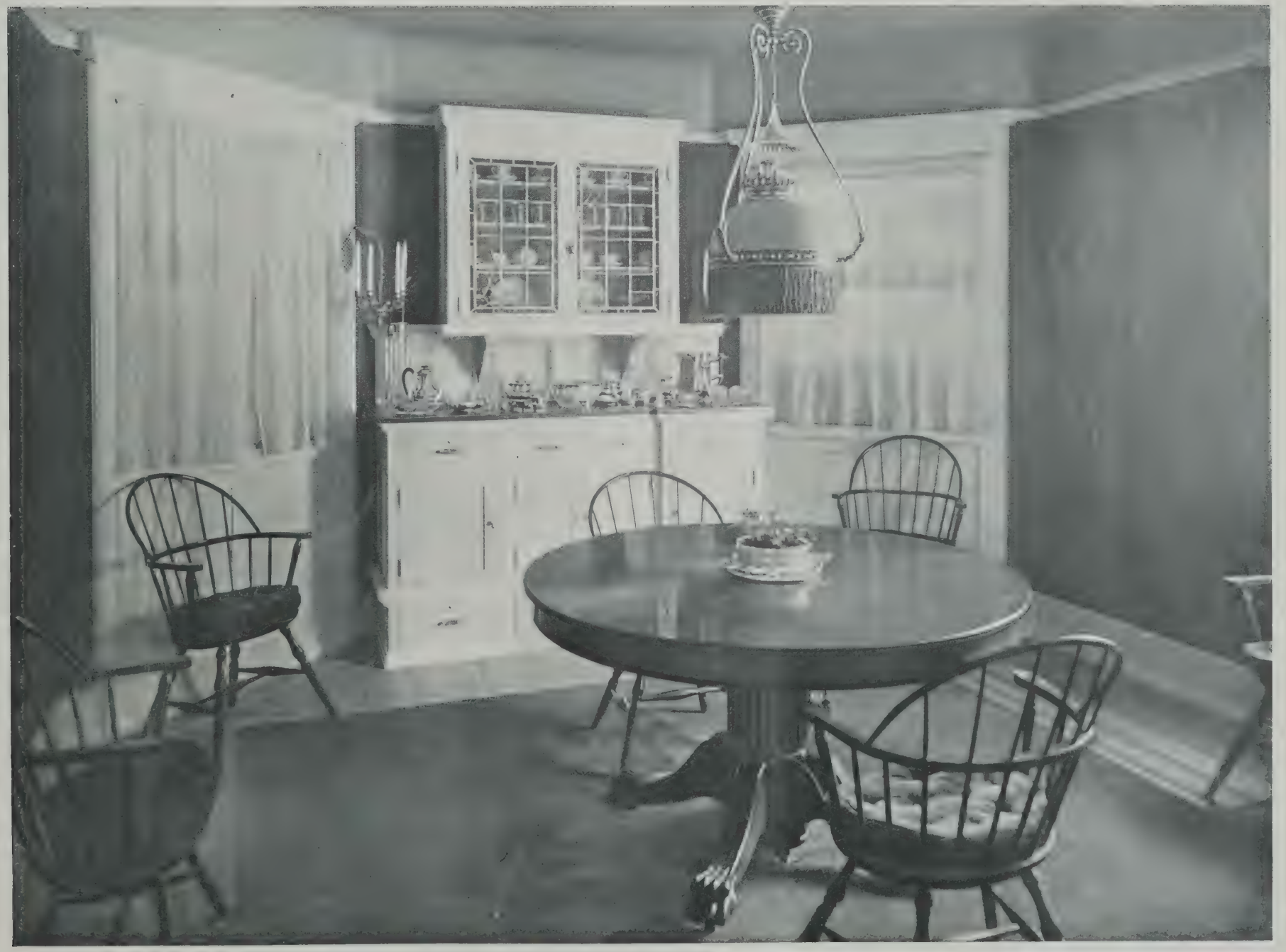

AN ARCHITECT'S HOUSE AT CHESTER HILL, MOUNT VERNON, N. Y.—See page 55.

MESSRS. LOUIS HERBERT LUCAS AND WILLIAM A. CABLE, ARCHITECTS.

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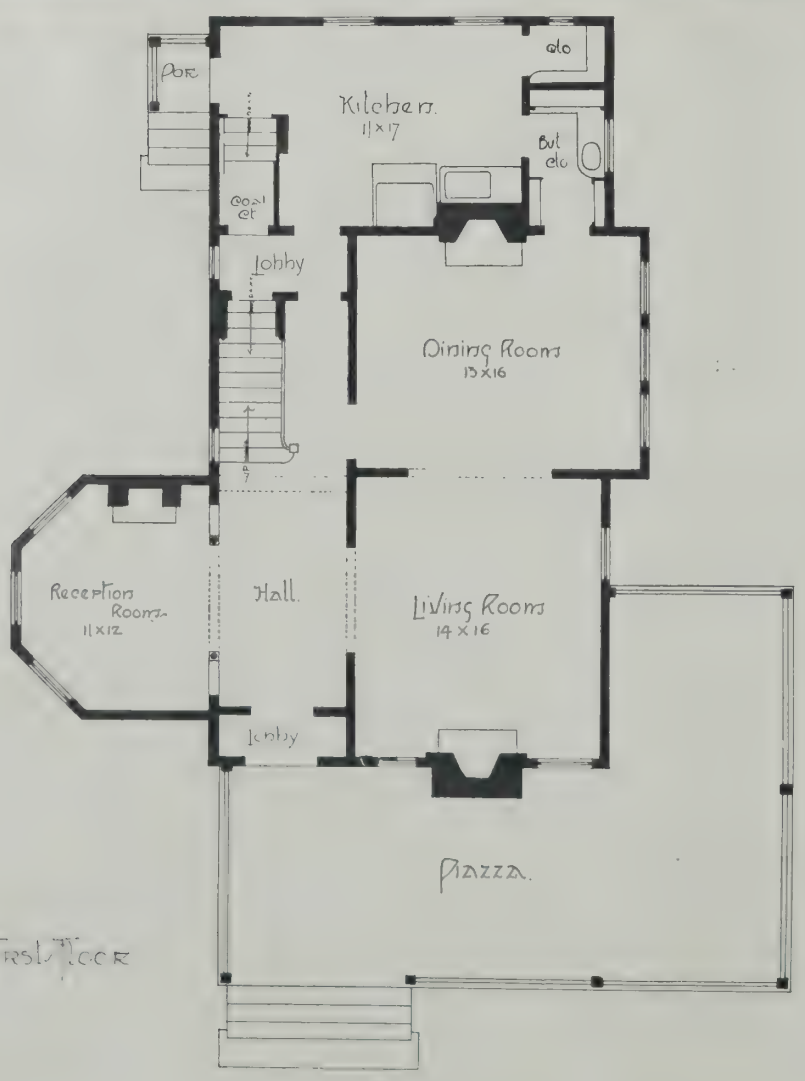

A MODERN DWELLING AT PLAINFIELD, N. J.—See page 56.

MESSRS. BENSON & BROCKWAY, ARCHITECTS.

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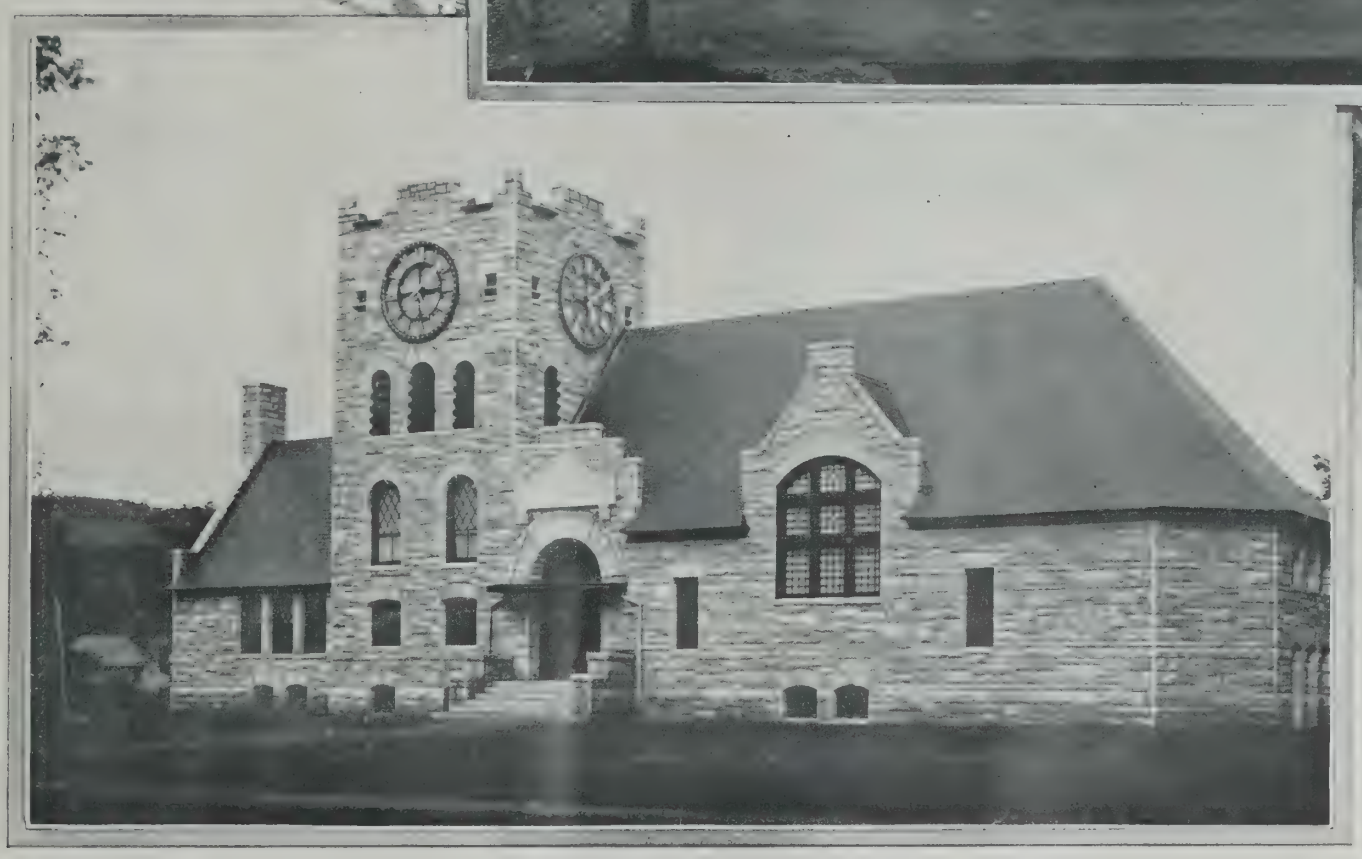

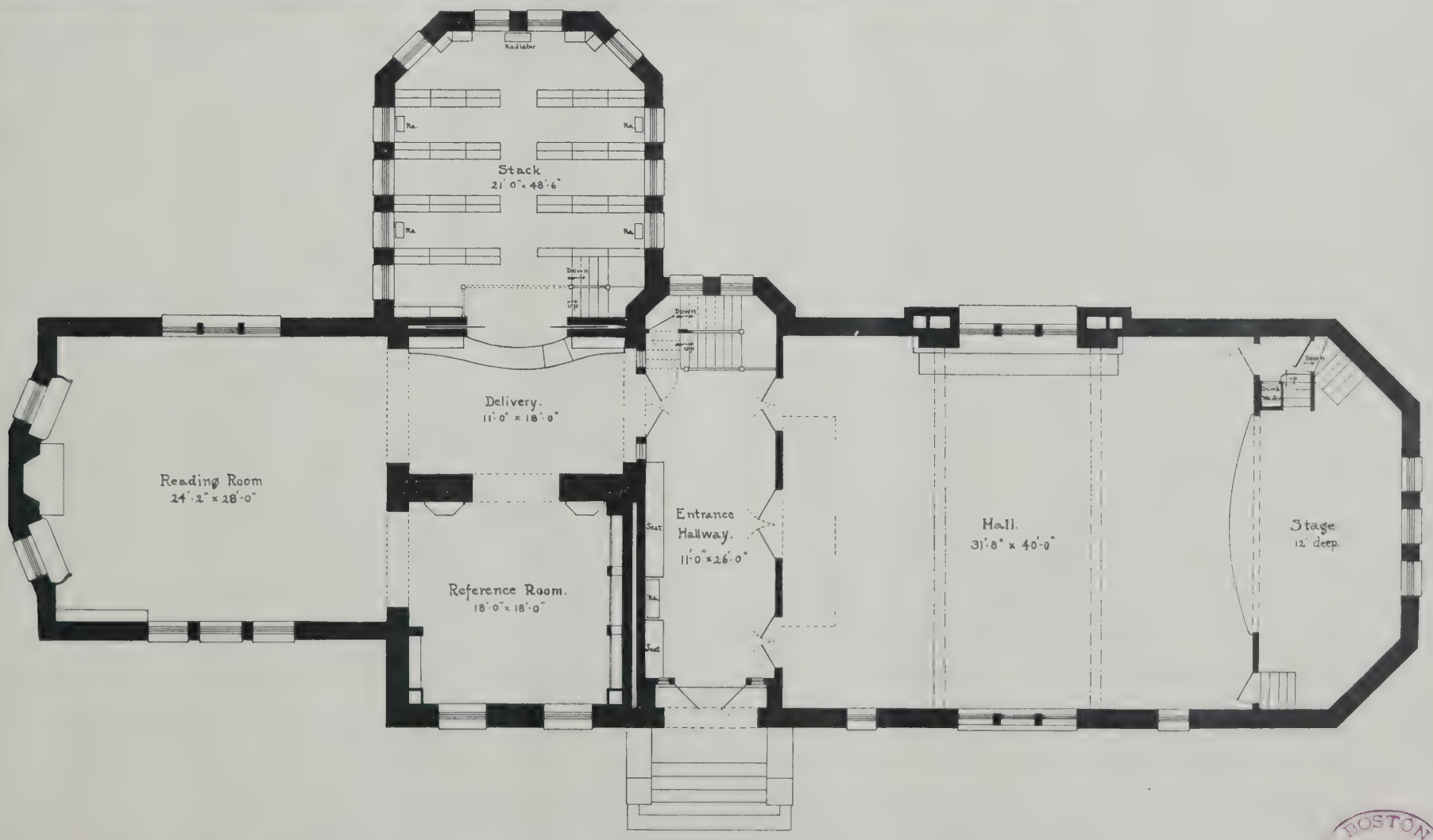

THE SCOVILLE MEMORIAL LIBRARY AT SALISBURY, CONN.—See page 42.

MESSRS. STONE, CARPENTER & WILSON, ARCHITECTS.

BOSTON PUBLIC LIBRARY

A COLONIAL RESIDENCE AT ALLENHURST, N. J.—See page 43.

COAST LAND IMPROVEMENT COMPANY, ARCHITECTS.

PUBLIC LIBRARY

First Floor

Second Floor

A MODERN TWO-FAMILY FLAT-HOUSE AT ALBANY, N. Y.—See page 42.

MR. WILLIAM J. OBERMANS, ARCHITECT.

BOSTON PUBLIC LIBRARY

A RESIDENCE AT HARTFORD, CONN.—See page 43.

MR. H. NEILL WILSON, ARCHITECT.

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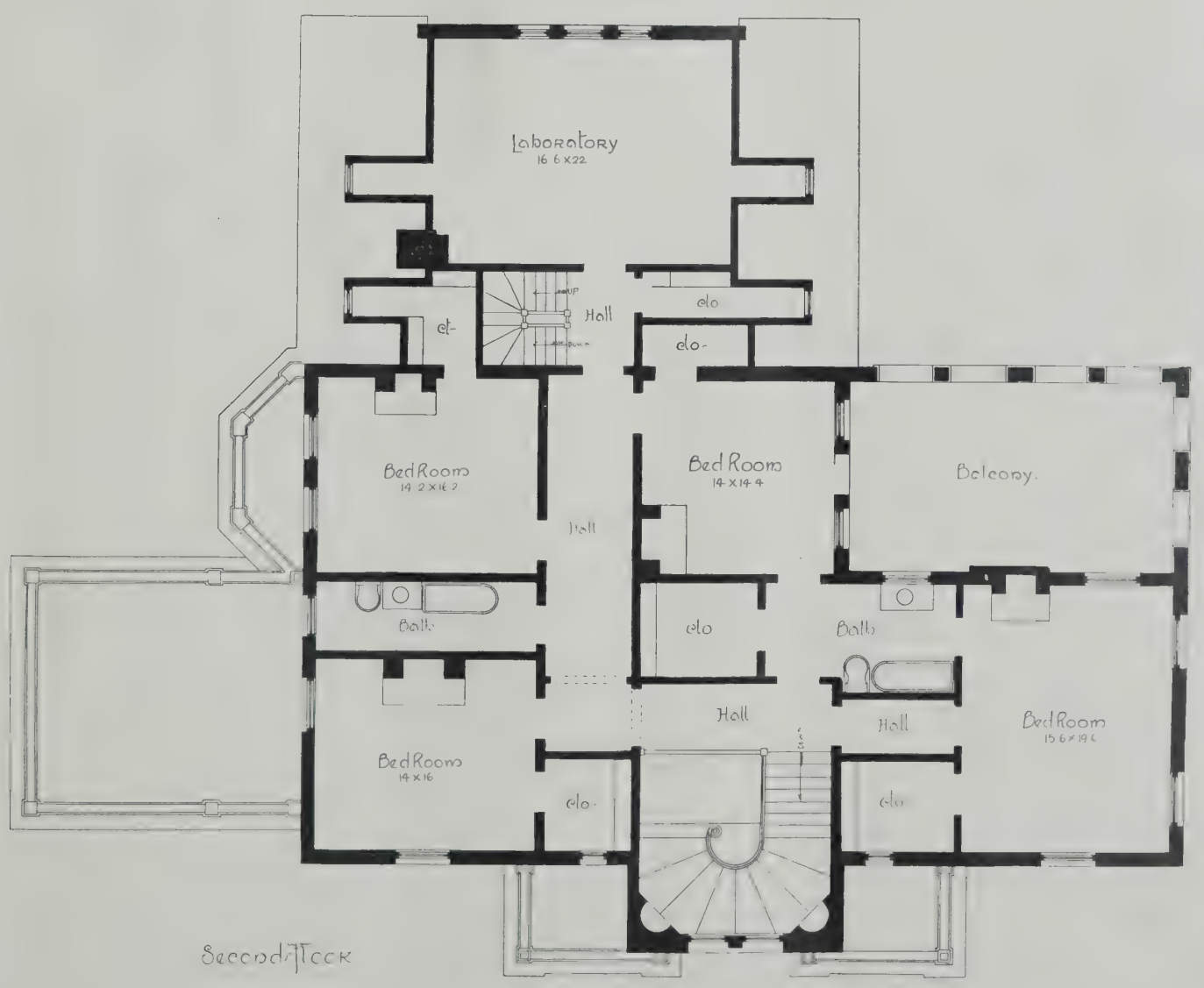

A RESIDENCE AT HARTFORD, CONN.—See page 43.

MR. H. NEILL WILSON, ARCHITECT.

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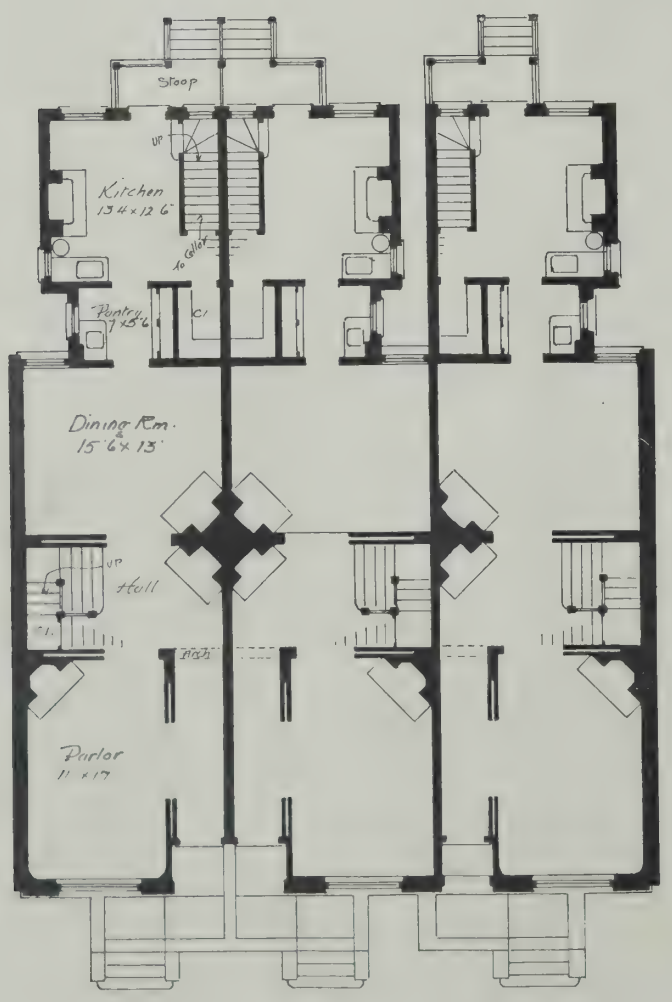
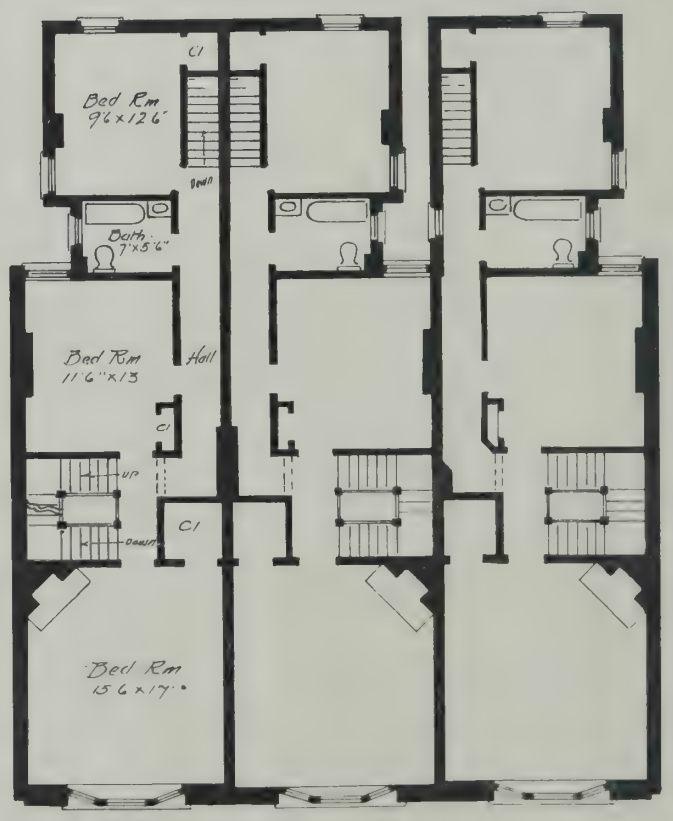


First Floor Plan.



Second Floor Plan.

A GROUP OF THREE BRICK DWELLINGS AT NEWARK, N. J.—See page 56.

MESSRS. HURD & SUTTON, ARCHITECTS.

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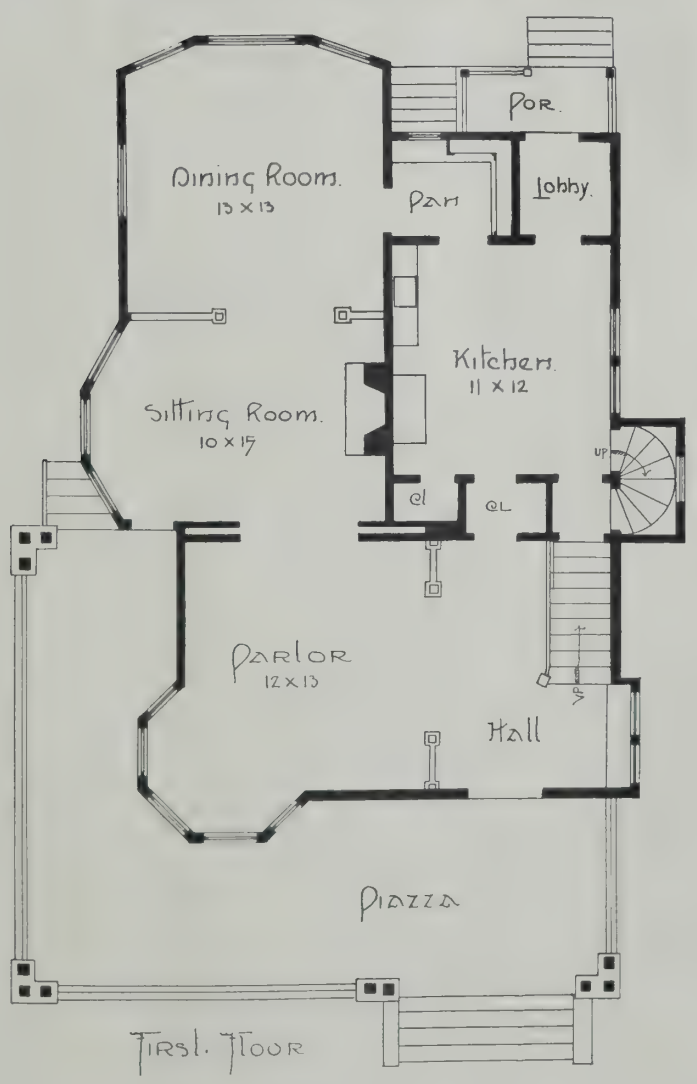
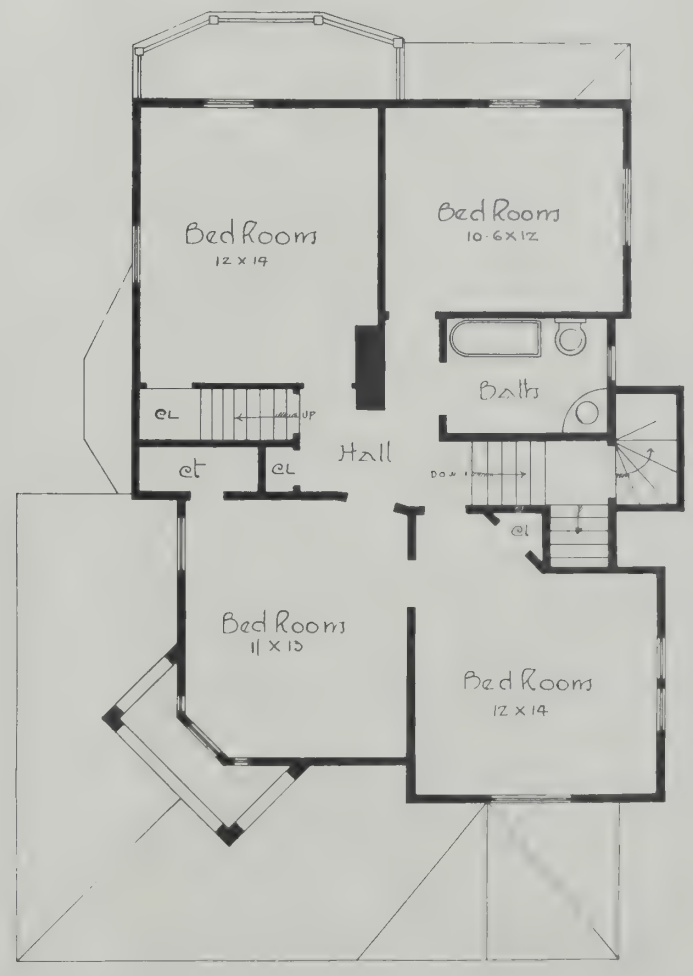
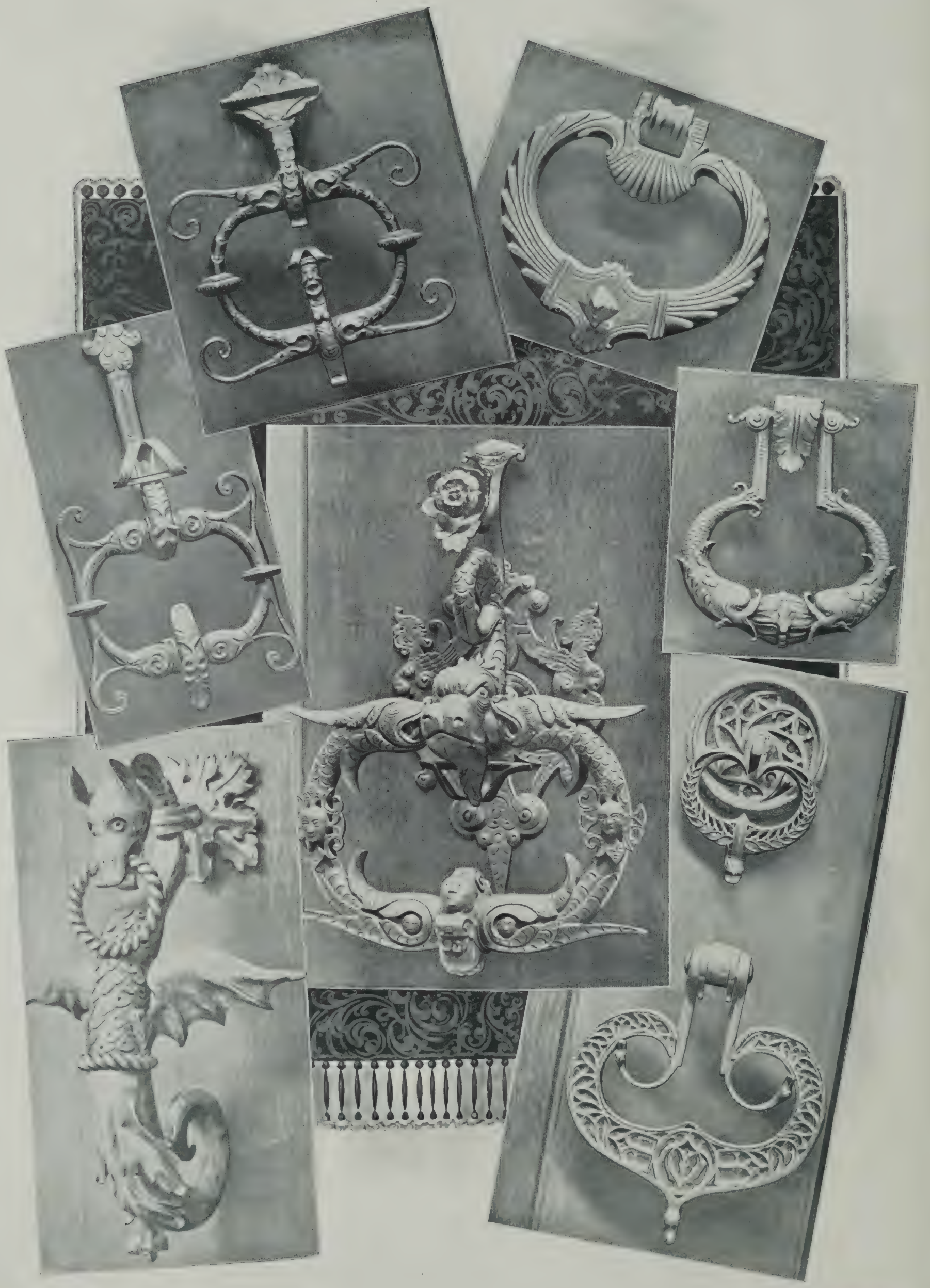




A MODERN DWELLING AT UPPER MONTCLAIR, N. J.—See page 43.

MR. S. C. SMITH, ARCHITECT.

POST PUBLIC LIBRARY



A GROUP OF ARTISTIC DOOR KNOCKERS.—See page 57.

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A COLONIAL RESIDENCE AT ALLENHURST, N. J.

(Continued from page 48.)

features and good detail, including the fine portico, with its massive Ionic columns. The underpinning is built of brick, and is coated on the outside with Portland cement, and marked off in squares to imitate stone. The building above, of wood, is covered on the exterior with sheathing, paper, and clapboards, and painted a pure white, with bottle green blinds. The roof is covered with shingles. Dimensions: Front, 59 ft.; side, 56 ft., not including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior arrangement is most complete, and it is planned with a central hall. The hall is trimmed with quartered oak, and it has a paneled wainscoting six feet in height, and a beamed ceiling. The staircase is quite a feature of hall, with its central run to a broad landing, provided with a nook, with columns and paneled seat, and a continuance of the stairs both to the right and left to second floor. The fireplace is built of brick, and it is furnished with tiled facings and hearth, and a mantel of excellent design. A coat closet beneath stairway and a toilet at the end of hall are both good conveniences. The drawing-room and library are trimmed with pine, and are treated with china white enamel. Both are separated from each other by an archway with columns, and the former contains an ornamental fireplace with tiles and mantel of dainty design. The living and dining rooms are trimmed with oak, and are provided with open fireplaces with tile trimmings and mantels. The dining-room has a bay window thrown out for sideboard, and which is separated by an archway with columns. The butler's pantry and kitchen are provided with all the late modern improvements. The second floor is trimmed with white pine and treated in white enamel. It contains a large open hall, with nook, with seats and columns, four bedrooms, two bathrooms, and two servant bedrooms, with private stairway to kitchen. The bath rooms have tiled wainscotings and paved floors, and are furnished with Standard porcelain tiled tubs and Ronalds & Johnson fixtures, with exposed nickelplated plumbing. The third floor contains four bedrooms, bathroom, and trunk-room. A cemented cellar contains furnace, laundry, and other necessary apartments. The mantels and fireplaces were furnished by Bradley & Currier, of New York. The Coast Land Improvement Company, of Allenhurst, N. J., were the architects and builders.

Our engravings were made direct ly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

AN ARCHITECT'S HOUSE AT CHESTER HILL, MOUNT VERNON, N. Y.

WE present as a subject for illustration on pages 41, 44, and 45, in this issue, a model suburban house recently erected for Mr. Louis H. Lucas, architect, Chester Hill, Mount Vernon, N. Y. The design is admirable for a building of this character, with its graceful outlines; its spacious and well shaded porch, combined with an excellently planned interior arrangement, makes a house complete and all that is desirable for a suburban home. The owner being an architect, special attention has been given to the plans, which have been executed with an idea of securing, so far as possible, a modern dwelling house of the highest perfection. The underpinning is built of brick, with white marble window sills of the Colonial style. The superstructure is of wood, and is covered with sheathing, paper, and white cedar shingles, left to weather finish a natural silvery gray color. The trimmings are painted cream white. The roof is covered with white cedar shingles and treated in the same manner. Dimensions: Front, 36 ft. 6 in.; side, 45 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior of the house is most pleasing and attractive, and while the details shown herewith have been carefully studied, the chief charm of the house is the effect of color and the broad, simple way in which it is treated throughout the various apartments. The several engravings presented, while attractive in themselves, do not reproduce the colors, showing the harmony of the deep red burlap walls, the deep red rugs which cover the floors, the old ivory white trimmings, and the antique oak furniture, upholstered in a deep dull shade of green, the whole effect being restful to the eye immediately upon entering. The entrance is through a broad doorway, glazed with plate glass running from bottom to top, into a vestibule, the space on either side of same being utilized for closets. From the vestibule you enter reception hall, 12 x 12, which is treated with ivory white, while the walls are covered with red burlap of a deep rich color, and the highly polished hardwood floors, which are covered with a rug of deep red. From this reception room an archway leads to the living-room, which is treated in a most attractive manner. The apartment is 20 x 28 feet in dimensions, and the greatest length is broken by two rows of fluted columns, with Ionic capitals supporting square beams. At one end of room there is a broad, spacious staircase rising up to second floor, as shown in detail (Fig. 1). This detail shows the plan and elevation of the main staircase, with the paneled nook and seat at side, the angle of the rise, and the form and dimensions. This staircase is formed by a beamed archway, supported on two fluted Ionic columns, the one at beginning of rise to staircase forming the newel, from which springs the hand-rail and balusters. This rail, balusters, and seat are of quartered oak. The plan shows a ten-inch tread and seven-inch rise, the combination of which makes a perfect stairway. The stairs star

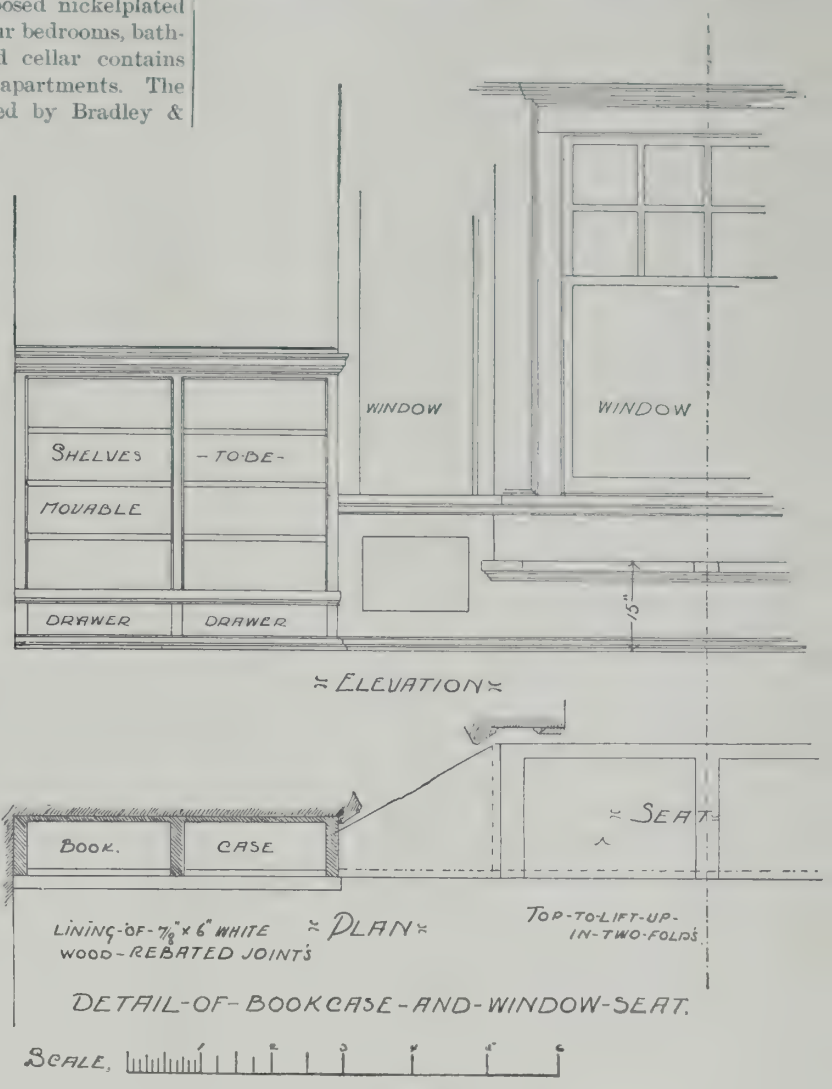


FIG. 2.

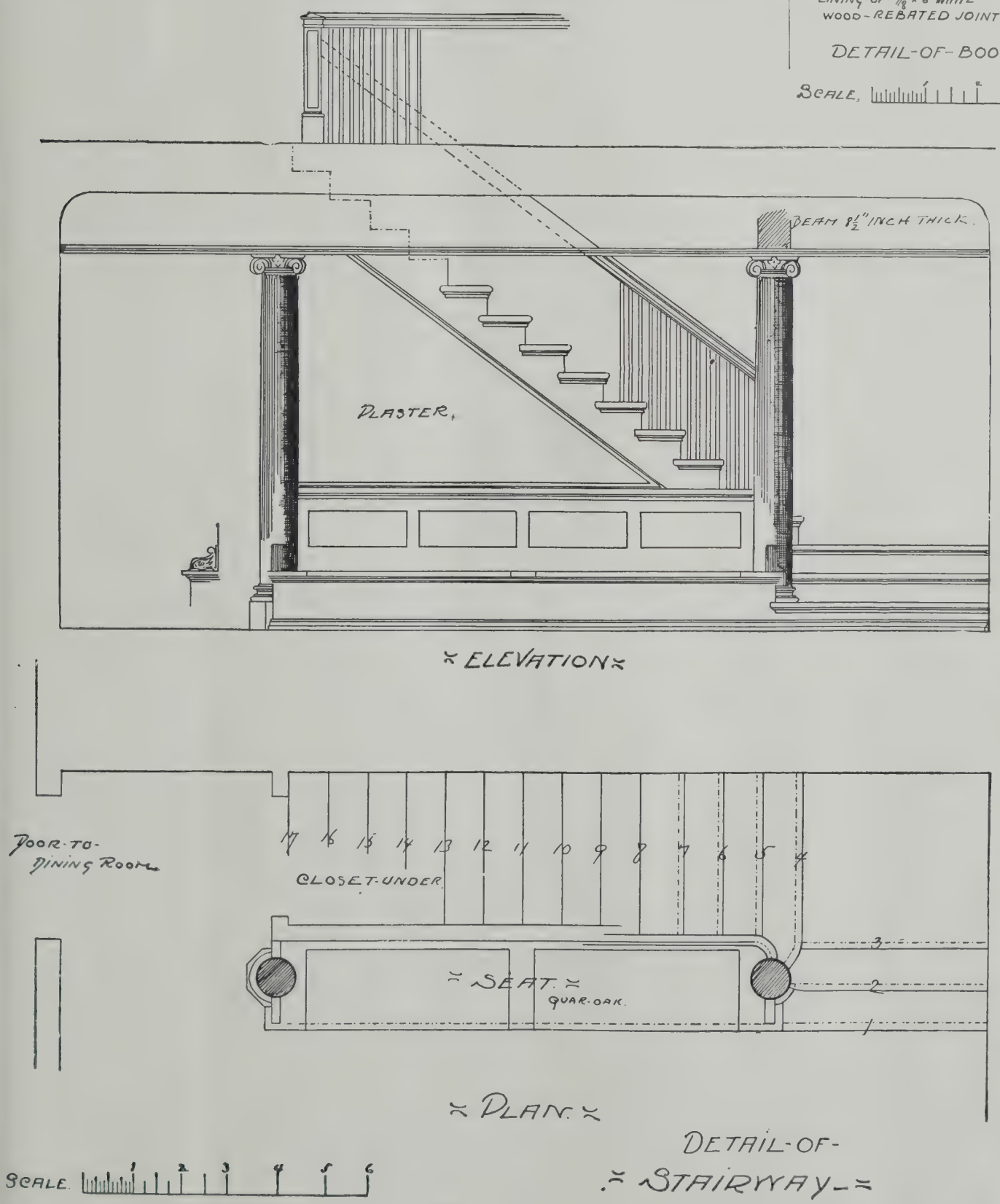


FIG 1.

with a breadth of a little over four feet to a broad landing, from which the stairs rise in one straight flight to second floor. This is also an admirable feature, for a stairway with winders, or too many landings, is

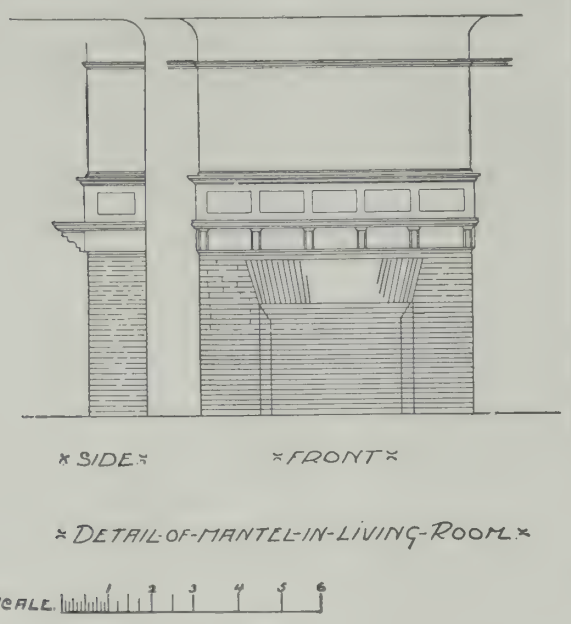


FIG. 3.

objectionable for comfort. The carving on the capitals of columns may be provided from the carved moulding factory at much less cost than hand work, and as they are cut out of solid wood (not pressed) they are in every way as desirable as the most expensive hand carving. The principal advantage in the latter is the ability to have original or exclusive design, as the one of which we illustrate. Dimensions, space, and surroundings have all to be taken into consideration in the planning of a staircase, as well as cutting the various parts to fit. This is a work for a specialist in most cases, because the professional stair-builder is much better equipped to not only get out the parts, but to put them together, than any ordinary carpenter; and, besides, he will save both time and cost, as well as producing a much more satisfactory piece of work. Detail Fig. 2 shows the opposite end of room, and beyond the row of columns, where a bay window is thrown out with paneled seat, at either end of which there is a bookcase built in, with movable shelves. The paneled seat is provided with lids and hinges. The large open fireplace, as shown in Fig. 3, is built of Roman brick, of a warm yellow color, with the hearth and facings of same, and the whole is finished with a paneled shelf supported on brackets, with an overmantel above shelf. The walls are covered with a deep red burlap, the cove and ceiling is treated in a cream white and the trim in ivory white. The dining-room is treated also in ivory white enamel in a dainty and artistic manner. The walls are covered with a deep dull green burlap, and the cove and ceiling cream white. The room being octagonal in form at one end, an opportunity is presented to provide a buffet, as shown in Fig. 4, and which is built in, with a broad counter shelf, below which are drawers and cupboards, provided with old brass furniture. Above this counter shelf a cabinet is provided, with latticed door effect. The trim at doors and windows, as shown in Fig. 5, is a simple mitred trim, very attractive and in keeping with the character of the house for which it is intended. The butler's pantry is provided with dresser, cupboards, and closets. The kitchen, of good dimensions, is well lighted and ventilated, and is provided with a store pantry, sink, stairs to cellar and to second floor, and a slate hearth, provided with a Thatcher range, a York gas range, and everything to be found in a well regulated dwelling. The second floor is treated in white enamel, and the walls are decorated with large flower designs. This floor contains three bedrooms, dressing-room, five large, well fitted up closets, and bathroom. The bathroom has a tiled floor and wainscoting, and is provided with Ronalds & Johnson's enamel tub, shower-bath, and other fixtures, with nickelplated plumbing. The third floor contains two bedrooms and trunk-room. A cemented cellar contains a Thatcher furnace, and other necessary apartments. Cost, $5,500, complete. Mr. Louis Herbert Lucas and William A. Cable, architects, 1183 Broadway, New York. The contractors were as follows: Jenks & Plume, carpenters; A. A. Uitcht, mason; Harry J. Robinson, painting, all of Mount Vernon, N Y.

Our engravings were made directly from photographs of the building, taken specially for the Scientific American.

A MODERN DWELLING AT PLAINFIELD, N. J.

We present herewith on page 46, in this issue, a modern dwelling, which has been recently completed for D. C. Ivins, Esq., at Plainfield, N. J. The design presents an excellent example for a suburban residence, and it combines both finely executed elevations and well arranged interior plans. A feature of the exterior is the spacious and well shaded piazza. The underpinning is built of red brick laid up in red mortar. The superstructure, of wood, is covered on the exterior framework with sheathing, paper, and then shingles, left to weather finish a natural silvery gray color. The trimmings are painted cream white and the blinds bottle green. The roof is shingled and finished similar. Dimensions: Front; 34 ft. 10 in.; side, 41 ft. 4 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft 6 in.; second, 8 ft. 6 in.; third, 8 ft. The interior is trimmed with white pine and painted in colors, in harmony one with the other. The hall is a central one, and it contains an ornamental staircase turned out of pine. The reception and living rooms are separated from hall by archways, the former being provided with Colonial columns. This reception-room is treated in ivory white, and it contains an open fireplace, with tiled hearth and facings, and mantel of dainty design. The living-room is provided with an open fireplace built of Roman brick, with facings and hearth of same, and mantel. The dining-room is well lighted by a cluster of windows, and is provided with a similar fireplace. The kitchen and its apartments are most complete in every respect, and is provided with a Thatcher furnace, etc. The second floor contains four bedrooms, seven closets, and bathroom, the latter furnished with a tiled wainscoting, Meyer & Sniffen Co.'s porcelain fixtures, and exposed plumbing, all nickelplated. The third floor contains three bedrooms and trunk-room. A cemented cellar contains a Thatcher furnace and range, laundry, and other necessary apartments. Cost, $5,000, complete. Messrs. Wyman & Haberle, of Plainfield, N. J., were the contractors. The building is furnished with the J. L. Mott and Henry Huber plumbing fixtures. The mantels and fireplace fixtures were supplied by Curtis M. Thorp, of Plainfield, N. J. Messrs. Benson & Brockway, architects, No. 53 Broadway, New York City, N. Y.

Our engravings were made directly from photographs of the building, taken specially for the Scientific American.

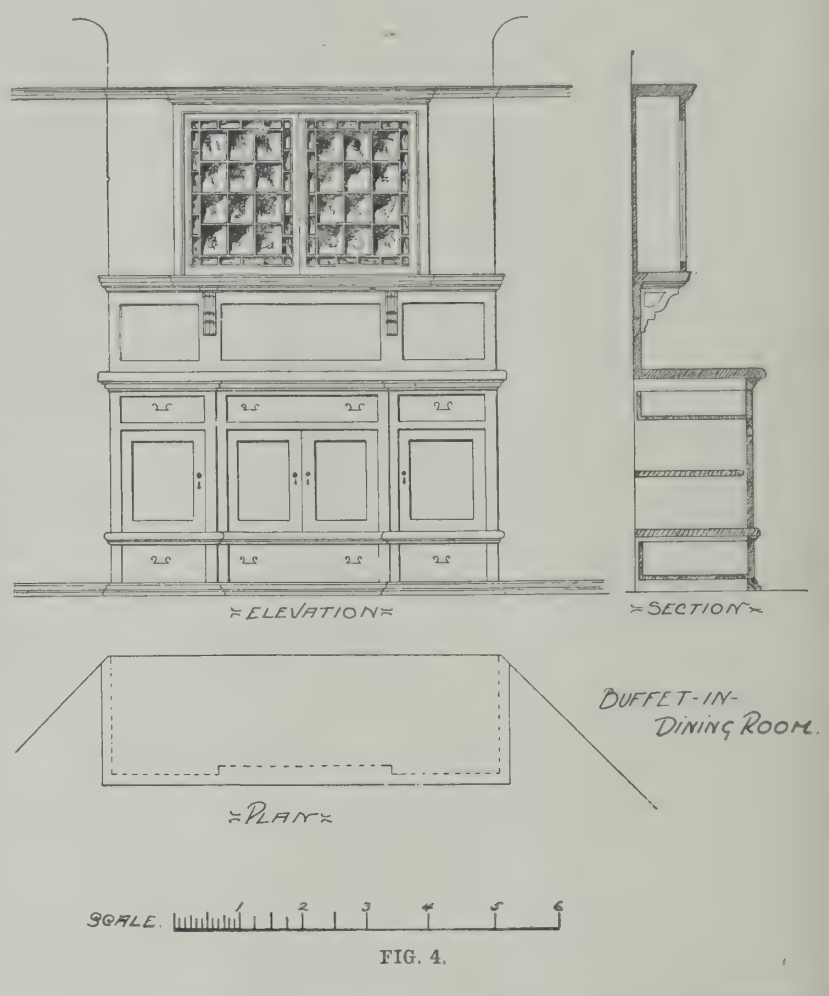


FIG. 4.

A GROUP OF THREE BRICK DWELLINGS AT NEWARK, N. J.

We present herewith on page 52, in this issue, a group of three brick dwellings, which have been recently completed for Mrs. Augusta Koch, at Newark, N. J. The design presented is a most excellent one for modern brick dwellings, and it shows what can be done with brick and stone. The underpinning and balustrade at porches is built of rock-faced sandstone. The front of the building is faced with gray pressed brick, with trimmings of tooled Indiana limestone. The pitched front roof is covered with slate, while the remainder of roof is covered with good quality of tin. The cornice is of galvanized iron. Dimensions: Front, 50 ft.; side, 60 ft. 6 in., not including porches. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The entrance to each house is through a vestibule and passage hall to foyer, which contains an ornamental staircase of ash, with broad landings. These foyer halls contain also open fireplaces, trimmed with tiled hearth and facings, and mantels. These halls and all rooms on first floor, are trimmed with whitewood and finished natural, except parlors, which are treated in ivory white. The parlors have open fireplaces trimmed with white enamel, tiled facings and hearth, and white enamel mantels. The dining-rooms have tiled open fireplaces and china cabinets built in. The butlers' pantries, kitchens and their apartments are provided with all the best modern conveniences complete, including a Provident range. The second and third floors are trimmed with white pine and painted. The second floor contans three bedrooms and bathroom, the latter wainscoted and furnished with a Standard Manufacturing Company porcelain lined tub and fixtures, and exposed nickelplated plumbing. The third floor contains two bedrooms and trunk-room. A

FIG. 5.

cemented cellar under the whole of building is provided with a Bundy La Flora steam heating apparatus, laundry, with Mott's Colonial wash trays, and other necessary apartments. Cost, $12,748, complete. Messrs. Hurd & Sutton, architects, Prudential Building, Newark, N. J. The contractors were as follows: Mason, R. R. Coursen; carpenter, Rhodes Brothers; plumbing, Besla Brothers; painting, R. V. Cueman; heating, W. D. Wolf & Co., all of Newark, N. J. The mantels and tiles were furnished by the Standard Mantel Company, of Newark, N. J.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

ARTISTIC DOOR KNOCKERS.

THE door knocker has been revived during the last twenty years, and diligent search has been made for good examples. The old Colonial door knockers are much sought after, and in one studio building in New York a large number of them have been fastened to the doors of the apartments. For the more elaborate examples we must look to the Continent, and our engraving, page 5, shows how beautiful this simple article can be made when an artist-artisan does the forging. For the examples selected for our group we are indebted to the Blätter für Architektur und Kunsthandwerk. Verlag von Richard Bong.

The Paris Fair as an American Sees It.

FROM A STAFF CORRESPONDENT OF THE NEW YORK TIMES.

THE national buildings ought to be one of the chief attractions of a universal exposition, and commonly they are. Unfortunately, the current architecture of every Continental capital is modeled upon that of Paris, and one no more looks for nationality in architecture than in costume. It is only in countries outside the pale of European civilization that there is any national architecture of the present. In the countries within it, one must fall back for local variations upon the architecture of the past. Unhappy, as we shall presently see, is the architect of a country which has no historical architecture, when he is called upon to devise something individual and distinctive to represent it in an international show like the Street of Nations. The street is really a quai, strung for perhaps a third of a mile along the left bank of the Seine and for the time annulling to that extent the Quai d'Orsay.

The pavilion of Italy, now, of course, closed, is the first in order of these national buildings "in partibus." It is also the largest and most costly, and architecturally it is one of the best and quite the most impressive. The designer has pillaged the picturesque Gothic of North Italy for the detail of a festal building of which the general form recalls St. Mark's at Venice, the tracery of the openings and the diapering of the panels the Doge's Palace, and which also contains reminiscences of Sienna and Orvieto. These things the architect has managed to combine into a real unity, so that it is not until after close inspection that one sees from how many sources the parts have been derived.

The color treatment is especially successful, converting the fronts into mosaics of which pale red and warm gray are the chief constituent tones. There is also a broad band of actual mosaic, from the factory of the contemporary revivalists of the art in Italy, girdling the front above the first story and adding to its decorated and festal aspect. It is a rich, harmonious, and effective pile, and the treatment of the substructure heightens its effectiveness. The continuous covered walk which runs along the river bank is roofed with a platform which forms the apparent base of the buildings, and the architect of each building has had the treatment of the supporting arcade, or colonnade, intrusted to him, wherewith to carry down his architecture. Nobody will dispute that the architect of the Italian building has come out best of all from this particular task. He has devised for his river front a series of segmental arches, apparently in stone, probably, in fact, of cement, projecting into corbels to support the platform, carried upon stout columns of not more than two diameters, all capitally proportioned, modeled, and adjusted. This unpretending feature is really one of the architectural successes of the Exposition.

Next to Italy comes Turkey. One has to own that the current Oriental architecture becomes rather tiresome when seen in such quantities as one finds of it here, unless it be redeemed by some special grace of mass or detail, as not seldom happens. But it does not happen in the Turkish pavilion, which seems but a big pot boiler, of which the designer became as weary as he is in danger of making the inspector of his work. It is unmistakably Turkish, with its big unmolded arch and its dome and its minaret, and that is about all there is to be said of it.

Next comes the pavilion of our own beloved land, which has been so much talked about, and so little in a complimentary strain. It must be owned that the thing is a failure, though the failure does not really impeach the competency of the architect. It was almost foredoomed to failure. To begin with, the allotment of space was not adequate to a building as large as this needed to be for its practical uses. The actual building calls for a plot at least twice as big, to avoid elbowing its neighbors in a manner equally injurious to them and to itself. The manner in which it is hemmed in would deprive it of its due effect if it were a good deal better than it is.

And then there is that vexing question of a national expression in a nation which has not yet attained such an expression in architecture, and which seems at present to be further from it than ever. I have heard it suggested here that we ought to have had a skyscraper, about the nationality of which it is true that there could have been no doubt, but which would evidently have been quite irrelevant to the practical requirements of the case.

A glorified and artisticized log cabin, such as Idaho honored herself by contributing to the State buildings at Chicago, might have offered itself as a solution of the problem. Or, in default of that, we might have had a piece of Richardsonian Romanesque, about the nationality of which there could also be no question, and which is the nearest we have come to a national expression in building which is also an artistic expression. The omission to try this solution is the more striking since one of the architects of our pavilion is also, I believe, a pupil of Richardson. The structure is supposed to be a kind of epitome of the Capitol at Washington, and by making believe very hard, like Dick Swiveller's Marchioness, one can perceive the resemblance. But to epitomize the Capitol on an area of possibly seventy feet square, and in a building virtually cubical, was a task probably beyond the power of any architect, and certainly beyond the power of the architect who was misguided into attempting it. The quadriga over the portal would make its effect if there were more space in which it could be detached, but it suffers from the huddle, like the whole building. The statue of Washington, effective in spite of the imputation to George of an attitude which he would have blushed all over to assume, is well seen from the river, but only from the river. You cannot "get it" on shore. The permanent erection, in the quarter of the Arch, is much better placed, in spite of the criticism of my cabman, which seems to be that of everybody, that the statue is "mal tourné."

But when we have duly condemned the exterior it is only just to add that nothing could be better fitted than the interior for its use as a resort for wandering Americans, where they may sing the songs of the Lord in a strange land, and where, let one wandering American gratefully testify, nothing can exceed the consideration and kindness with which they are received and assisted.

Next to Italy, perhaps in some respects some of them surpassing Italy, the successes of the street are the buildings of Germany, Hungary, Norway, Great Britain, Belgium, and Greece. Next to the United States its chief failures are the buildings of Austria and Spain. There is some authentic detail of the Spanish Renaissance on the front of the Spanish Building, but it is not attractively reproduced or placed, and the building, as a whole, is characterless and dull. The real Spanish architectural exhibit is the reproduction in the private building of "Andalusia" of the Giralda at Seville, which is a very jolly performance. The Austrian chateau is simply stupid, and does no sort of justice to the abilities of the present generation of architects in Vienna.

The prevalence of Germany is the chief feature of the whole exposition, except as regards the hostess, just as it was the chief feature of the Columbian Fair at Chicago, and just as the industrial progress of Germany is the most obvious "world fact" of the last decade of the century. The German Building is the tallest in the competition, and the most spacious after the Italian. It is very much the same sort of thing they gave us at Chicago, an example of the indigenous German Renaissance, as resolutely gay and festive as any of the French temporary palaces, with the substitution of more heartiness as a compensation for less elegance. It is a solid construction like the earlier, and like that faced with white plaster, which is painted in spots with rough but undeniably jolly decorations. It is a really representative pavilion.

So much cannot be said of the Hungarian Building, which comes between Bosnia and Great Britain. Indeed, it could not be, for, excepting what has been done at Budapest within the past generation, Hungary is as far as ourselves from having attained a national architecture. Hawthorne said that we ought to live in tents, and certainly we could not expect gypsies to be great builders. The architect of the Hungarian Building has nevertheless managed to produce one of the most artistic buildings of the row. He has frankly borrowed his architecture from Bavaria, and especially from Nuremberg, and has adjoined the apse of St. Lorenz, I believe it is, to a flank of wall decorated and punctuated with enriched reproductions of the oriels of the famous Nassauer Haus. Whence he derived the tower I know not, apparently from his inner consciousness. It is not very good, but all the rest is very good, indeed, an exemplary piece of compilation, and the back of it, in heavy Romanesque, is as good in its way as the lightsome Gothic of the front.

Belgium has contented herself with the reproduction of one of the Flemish town halls, that of Oudenarde, I believe, the exact prototype is, and whether or not the reproduction be exact, the effect of it is excellent and the local color unquestionable.

Great Britain is pretty certain to be represented with good taste at a World's Fair. Certainly that was the case with the half-timbered cottage in Philadelphia and with the brick cottage at Chicago. It is equally the case with the quiet and intensely English Jacobean country house that represents her here. Evidently such a house needs a frame of grass and trees to be well seen. But without these advantages the gray brick mansion distinguishes itself by pietude and good breeding, and is a pleasant object to behold.

One would have expected of Greece a piece of the Acropolis, but Greece has been content to remind the spectator of her history during the Christian era. This she has very charmingly done with a reproduction of a Byzantine-domed church of the best type and period, successful in form and outline, and equally successful in the surface decoration which accrues from building its walls and its cupola of alternate bands of dark blue and pale red.

Sweden and Norway, as usual, insist upon a separate representation. Inevitably they are both represented by timber constructions, of which that of Sweden is the bigger, but that of Norway much the better. This plain clapboarded cottage, painted dark red, and with its construction cleverly indicated without being forced upon the sense, is one of the very best things here. It might well supply hints for the designer of a shore or a hill cottage at home. And, indeed, there is much that is useful for edification to the modern architect in the Street of Nations, while the mere wayfaring man cannot fail to find it amusing. If he be an American, he will be chagrined to find that his own country is the worst represented of all, and that the unfounded and unsuccessful pretentiousness of our National pavilion comes nearer to positive vulgarity than any one of its competitors.

M. S.

The Cesspool.

A COMPARISON OF PRIMITIVE AND MODERN METHODS OF TREATING SEWAGE.*

BY LEONARD P. KINNICUTT, D. S.

BACTERIA are a low form of vegetable organism which multiply by a process of transverse division. Though commonly considered as dangerous enemies they are in fact our greatest friends, for it is only a comparatively few species, those that exist on living matter, that cause disease. The great majority obtain their nutritive material from dead animal and vegetable matter, and resolve these substances into similar compounds, as carbon dioxide, water, ammonia, nitrates, which are the food supply of higher vegetable life. Were it not for the presence of these bacteria, disposing, as they do, of effete organic matter and changing it into plant food, human life on this earth would, seemingly, be impossible. These are the bacteria that are present by the hundreds in a cubic foot of air, and in a cubic centimeter of so-called pure water, and by the millions in a centimeter of polluted water, or of sewage.

Bacteriology as a science may be said to date from Pasteur's experiments on the causation of the putrefaction of beer and the souring of wine, in the middle of the present century, and it is only at a very recent date that there was any reliable knowledge as to the action of bacteria in the purification of sewage.

Fresh sewage contains, in immense numbers, the class of bacteria which live on dead organic matter and which causes its decomposition. These bacteria can be roughly divided into two great groups, each containing numerous species. These groups are called the anaerobic and the aerobic groups. The anaerobic group embraces all those species that live, grow and multiply out of contact with air and light; the aerobic, those species that live, grow, and multiply best in air and light. Each group plays its own special part in the destruction of effete matter and the organic substances contained in household waste. The anaerobic bacteria act first. They disintegrate the solid animal and vegetable matters, liquefy them and bring them into solution. The aerobic bacteria act upon disintegrated and liquefied compounds and, by a process of oxidation, change them into harmless gases.

For the destruction of dead organic matter, both groups of bacteria are necessary; the anaerobic to disintegrate and liquefy the complex organic substances, the aerobic to change those simplified and liquefied compounds into harmless substances.

Taking the above as a brief outline of what takes place in the decomposition of excreted and effete matter, we are in a position to consider the changes that take place in the cesspool.

Into the cesspool enter all the waste products of human life, and with these waste products, millions of bacteria, both anaerobic and aerobic. But the contents of the cesspool being practically shut off from air and light, it is

* From an address before the Massachusetts Association of Boards of Health, July 29, 1900.—From Municipal Engineering.

a most suitable environment for the development of the anaerobic bacteria. These bacteria immediately begin to act upon the solid compounds in the excreted and other household waste. The complex nitrogenous substances are broken up and liquefied, also compounds like cellulose in its various forms, like paper, starch, woody fibre, are disintegrated, and, finally, if the action continues a sufficient time, all that remains in a solid state are chiefly what we can call the ash or the mineral matter of the animal and vegetable substances that entered the cesspool. The action that takes place in the cesspool might be compared to the process of combustion. If the substances that entered the cesspool had been burned in a furnace, we should have left behind only the ash, all else being given off in the form of various gases. In the cesspool the bacteria have taken the place of heat. All the solid matter that remains is the ash. All else, however, has not been changed into gas, but, to a great extent, into substances soluble in water.

Liquid that passes through the cesspool as it leaches through the soil, or as carried away by a drain and allowed to run on land, comes in contact with air, and the conditions become favorable for the development of the aerobic bacteria, and the final process of purification begins. The liquefied compounds are most easily acted upon by the bacteria, and the compounds changed, as I have said, into harmless gases and mineral substances.

It thus appears that our forefathers, without any knowledge of bacteriology, devised one of the most efficient methods for the purification of household waste, and one which I will show in a moment that has, during the past two years, been utilized for the purification of sewage in large cities, and one that has great promise of being most successful.

The question as to the dangers attaching to a cesspool I do not at this time care to consider at any length; but it seems to me that the danger arising from the use of cesspools has been overestimated. Certainly, in the decomposition of the solid complex compounds of the anaerobic bacteria, a large amount of gas is given off. This gas, however, is composed chiefly, as I will show later, of carbon dioxide, marsh gas, hydrogen, and nitrogen, and resembles concentrated sewer gas, but does not contain, as far as we know, any amount of sulphite of hydrogen or other poisonous gas.

If the liquid in the cesspool is on different levels at different times so that the sides at times become dry, there may be danger of some pathegenic germs being in the gas that escapes from the cesspool, but the above condition cannot exist if the inlet pipe enters the cesspool at a lower level than the exit drain.

If the liquid in the cesspool percolates through the sides of the cesspool and the soil is hard clay, it may, while still containing a large amount of soluble, polluting matter, enter a water supply, as a well or a stream; but if the cesspool is in sandy soil there is very slight, if any, danger, as late experiments have shown that organic matter in the condition that it is in on leaving the cesspool, is changed with the greatest rapidity into absolutely harmless compounds. If the liquid is carried by a pipe from the cesspool and discharged over land or near a well or stream, it seems that there could be no danger. As to the escape of any dangerous gas from the soil near a cesspool, I do not see how it is possible.

Having thus tried to answer the question why cesspools do not quickly fill up with solid matter, and also to describe what changes take place in the cesspool, I wish to describe how this method has been made use of by sanitary engineers for treating sewage on a large scale.

Mr. Scott-Moncrieff, the well-known sanitary engineer of Ashland, England, was, I believe, the first to recognize that the bacterial purification of sewage took place in two stages, and that the first stage should serve as a prelude to further treatment. He erected, in 1891, at Ashland, a tank, or cesspool, for the express purpose of liquefying the solids in sewage, in which the sewage was forced upward over a bed of stones.

The credit, however, of showing that a modified cesspool could be advantageously used for the treatment of sewage of cities and towns belongs to Mr. Cameron, of Exeter, England. The process was named by him the septic treatment, and it is by this name that it is now known.

He built at Exeter, England, an underground tank of cement concrete, sixty-five feet long, nineteen feet wide, and of an average depth of seven feet, and having a cubical capacity of 53,000 gallons. The tank was covered with a concrete arch, and a portion of the tank near the inlets was made about three feet deeper than the rest, and partially cut off by a low wall, forming a couple of pockets or grit chambers to retain sand, grit, and road washings. The inlets were carried down to a depth of five feet below the surface, so that air could not make its way down with the sewage, and also so that gases could not escape from the tank back into the sewer. The effluent outlet was also below the level of the liquid, and, to avoid any current that would be liable to carry with it any of the floating matter from the surface, a cast-iron pipe was carried across the whole width of the tank fifteen inches below the surface, and on the lower side of this pipe there was a continuous opening about one-half inch wide. An iron pipe, about one and one-half inches in diameter, extended out of the top of the tank to allow the escape of gases which were formed, and the sewage in the tank could be inspected by opening a manhole constructed in the centre and having glass windows.

At the plant of Exeter there are also five beds thirty-six feet long, twenty feet wide, and four feet deep, made water-tight and filled with crushed clinker or coke breeze. Such beds are admirably adapted for the cultivation of aerobic bacteria, and the liquid as it comes from the tank, having undergone the first stage in the process of putrefaction, is now in just the right condition to be acted upon by the aerobic bacteria.

In August, 1896, the main sewer of St. Leonard's, a suburb of Exeter, with a population of 1,500, and an average daily flow of sewage of 57,000 gallons, was connected with the tank, and the above volume of sewage has been continuously passed through the tank since that time. The effluent from the tank falls over a wall about one foot high, which effects slight aeration, and then by means of the alternating gearing is caused to pass automatically on one or the other of the beds.

Visiting the plant the effluent from the tank first strikes the attention. It is a brownish colored fluid, free from palpable suspended matter, but does contain solid matter in a state of very fine subdivision, almost like river salt. It has an odor, but at the four different places where I examined it the odor is not more offensive than that given off from the first or second basin used in the chemical precipitation process.

The liquid in the tank is covered with a thick, floating mass, dark brownish yellow in color, through which bubbles of gas are continually breaking. It appears to be composed of organic matter, but in fact I believe it is principally a mass of micro-organisms, and it is not until this floating mass has been formed that active septic action takes place. At the bottom of the tank there was last summer a deposit two or three feet in thickness, the accumulation of three years, as the tank has never been cleaned out. This deposit looks like sewage sludge, though it contains much less organic matter. From the iron pipe at the top of the tank issues a volume of gas which, when ignited, burns with a colorless flame about one foot in height. The unignited gas has no very marked odor, and does not contain appreciable amounts of sulphide of hydrogen.

What are the changes that take place in this tank? They are exactly those that take place in the cesspool. The most marked change is the disappearance of solid matter, and it has been demonstrated that from one-half to two-thirds of the total solid matter has decomposed and liquefied.

In this decomposition a large amount of solid matter is changed into gaseous compounds, as ammonia, carbon dioxide, marsh gas, hydrogen, and nitrogen. Of these ammonia and part of the carbon dioxide remain in solution, while the others, being insoluble in water, escape from the tank.

That a large volume of gas is given off from the septic tank is seen not only at Exeter, but everywhere the septic tank is in use. The gas at Exeter burns with a flame over one foot in height. The only determination as to the amount of gas that is given off is, so far as I can learn, one that was made by H. W. Clark, chemist for the Massachusetts State Board of Health, working with a very small experiment tank. His results indicate that from 5 to 6 tenths of a cubic foot of gas is formed from 100 gallons of sewage.

Analyses of the gas have, however, been frequently made, and though, of course, it must vary greatly from time to time, the following analyses, made by Dr. S. Rideal, give an idea of its composition:

Carbon dioxide	0.3 per cent.
Marsh gas	20.3 per cent.
Hydrogen	18.2 per cent.
Nitrogen	61.2 per cent.

Who first saw that a similar action to that which takes place in a closed tank must also take place in a large open tank is not known. Undoubtedly the same thought occurred to many persons at about the same time, for, of course, the conditions in both must be practically the same.

No free oxygen can be present in an open tank when full of sewage, and the sewage containing, as it does, a large amount of suspended matter, very little light can penetrate down from the surface. Whoever may have first used an open tank for septic action, I found them last summer being used experimentally at Accrington, Huddesfield, Leeds, and Manchester. In all these places an old tank, which had formerly been used for chemical precipitation, had been turned into a septic tank, all the change necessary being to place the outlet so that effluent opening should be three to four inches below the surface of the liquid, although, of course, in the building of such a tank it would be better to have the inlet also beneath the surface. In all these places the general appearance of the liquid in the tank was the same, very dark and opaque, the surface coated with a thick layer of solid matter, and the activity of the action in the tank shown by thousands of bubbles of gas escaping through this layer of solid matter. The effluent was of a dark brown color, containing suspended matter in a very fine state of subdivision, but neither the odor given off from the tank or from the effluent was so offensive as to prevent its use by towns or cities. That the action which takes place in the open septic tank is very similar to that which takes place in the closed tank is shown by a series of experiments made by Mr. Fowler at Manchester. He made daily analyses for one month of the effluent from an open tank and of the effluent from a closed tank, both being supplied with the same sewage. The following table gives the average of these daily analyses. The results, as seen, are almost identical:

Parts in 100,000.	Open Tank.	Closed Tank.
Free ammonia	3.20	3.10
Albuminoid ammonia	0.50	0.51
Oxygen consumed	8.46	8.43
Chlorine	16.40	16.10

The real practical value of the septic tank, or we might say the cesspool, is that it destroys suspended matter without forming any great amount of sludge or precipitate, thus having a great advantage over any chemical precipitation process. That it seems to bring cellulose into at least partial solution, thus preventing the coating over of bacteria beds, either those of intermittent filtration or contact, with a layer more or less impervious to water. That it breaks up the more complex organic compounds, forming substances that are more easily acted upon by the nitrifying bacteria than the compounds in raw sewage. There is also another advantage in the use of the septic tank that it seems to me may be of great importance. In all bacterial treatment of sewage the changes that we have followed in the septic tank take place, but in the systems of intermittent filtration beds and contact beds the second phase of purification, nitrification, is also being carried on at the same time. If in either of these systems too little air is supplied, the aerobic or nitrifying bacteria cease to work, their place being taken by the anaerobic bacteria, which are unable of themselves to finish the process, and whenever the anaerobic bacteria have obtained the upper hand, as is the case when a bacteria bed is overworked, the bed becomes foul, and the product obtained is similar to a septic tank effluent. By using a septic tank, allowing the effluent to come in contact with air and then passing it onto a bacteria bed, the two phases of purification are kept separate, and better work is naturally to be expected.

I stated at the beginning of this paper that what we hold as true to-day we are told to-morrow is false, and so, in a year or so from now, I may come before you and say that the changes that take place in the cesspool are not due to bacteria, but are due to chemical action; and I say this now because there are certain facts that point in this direction. There is a class of chemical substances known as enzymes, or unorganized chemical ferments, which are the products of vegetable and animal life, and which, in minimum amounts, without being themselves used up, are able to break up and decompose large amounts of complicated and insoluble compounds. Thus the enzyme known as diastase decomposes starch; lifase, many fats; cytase decomposes and dissolves cellulose. These enzymes seem to decompose the complex organic substances by what, chemically speaking, is called hydrolysis—the breaking up of a compound by the addition of water. In this way substances like albumen may be broken up with the formation of nitrogen, ammonia, hydrogen, marsh gas, and carbon dioxide. Many of the enzymes being the products of anaerobic bacteria, they would naturally occur in the septic tank, and a large amount of the decomposition may thus be chemical, rather than bacterial.

Whatever is the cause of the changes that take place in the cesspool or septic tank, the changes are those that I have described, and I only hope that I have been able to point out to you that the most modern method of treating sewage is, in fact, the method of our forefathers.

The Emperor of Germany has remembered his visit to Constantinople in 1888, and Berlin workmen are now busy in erecting in Stamboul a memorial of the event, says The Architect. It will take the form of a remarkable fountain, and stands on the Place Meidan, near the ancient church of Agia Sophia. The structure assumes an architectural form and will be surmounted by a dome. Part of the building will be in Carrara marble. The columns will be of polished Labrador, with capital and bases of bronze. A frieze and other decorations will be in glass mosaic. An inscription in Arabic will record the name of the donor, and here and there Arabic proverbs will be inscribed. The design for the fountain is to be credited to the Emperor, and the works are carried out under the direction of Herr Spitta. Water receives so much reverence in the East it was a happy idea to select a fountain as a memorial of a visit which was supposed to be due to interest in the Turkish race and the Sultan's dominions.

FIREPROOFING WOOD.

DURING the past few months numerous tragedies, due to destructive conflagrations, have given indisputable evidence of the value of any system of fireproofing that will retard, if not entirely prevent, the wholesale loss of life and property by fire. It is, perhaps, for the reason that naval and military matters always exercise a powerful controlling influence on commercial affairs that the swift destruction of the Spanish squadron at Santiago did more to stimulate the search for a thorough and reliable fireproofing process than some greater conflagrations that had preceded Santiago. Be that as it may, the last two years have seen an unusual amount of research carried on in the matter of fireproofing, and some of the processes which have been devised have received full description in our columns. The recent tragedy at Hoboken, in which the docks and three of the vessels of the North German Lloyd Company were destroyed and several hundred lives lost by fire, has emphasized the urgent need for the application of fireproof methods, in constructing both the docks and wharves themselves and the ships which make fast to them; for one of the most important lessons of this disaster is that, if the docks and pier sheds had been of masonry and steel construction, or even being, as they were, of wood, had they been thoroughly fireproofed, the loss of life and property would have been greatly reduced.

The present article will be devoted to a description of the latest method of fireproofing wood, which has been invented and developed by Mr. Joseph L. Ferrell, of Philadelphia, and which for some time has been in successful operation in his hands at the plant of the United States Fireproof Wood Company, at 2220 Race Street, Philadelphia.

The process differs from those which have preceded it chiefly in three important particulars. First, that the wood is not subjected to any steaming or vacuum process for the purpose of emptying the cells of the wood by withdrawing the sap, preparatory to injecting the fireproofing liquor. Second, that the fireproofing liquor is forced into the wood under a much greater hydraulic pressure than has heretofore been used, or even attempted, with the result, as claimed by Mr. Ferrell, and it seems to us very properly so, that the fireproofing is not only accomplished with the least possible alteration of the physical properties of the wood, but owing to the extremely high pressure used, it is accomplished much more rapidly and with more perfect saturation. And, third, that by the intervention of the hydraulic accumulator an enormous pressure for the purpose of assuring heat treatment to hardwoods of all sections is communicated as beneficently to the wood as a very low pressure can be without the accumulator, besides ensuring great rapidity of saturation. Incidental to these improvements are certain mechanical improvements in the fireproofing plant, particularly in the design and operation of the gate of the receiver.

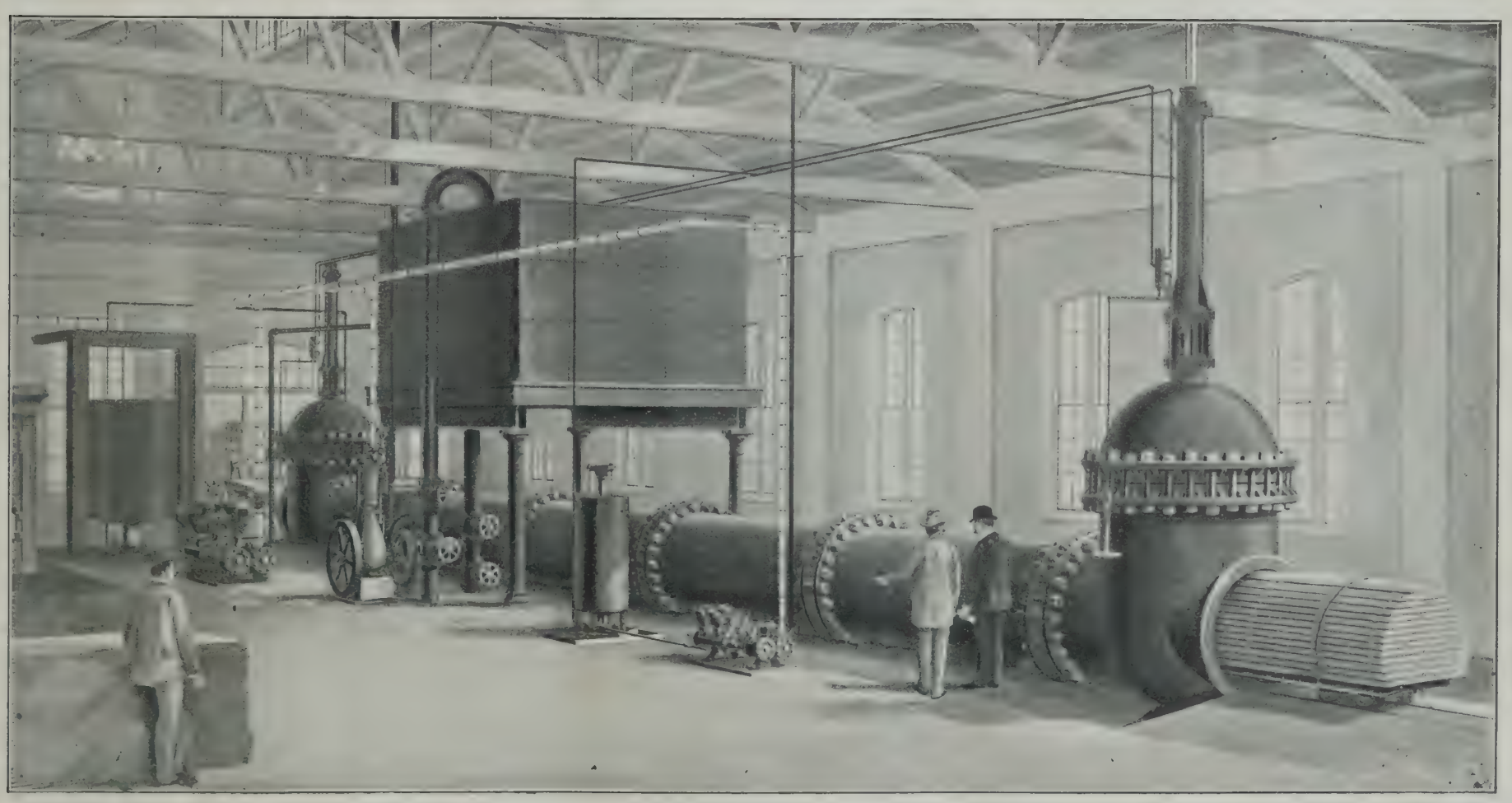
Although the working plant at Philadelphia was designed as a model plant to demonstrate the working of the new process, it is of such dimensions that it is capable of treating full size specimens on a commercial scale and has been for some time in continuous daily operation. It consists of a charging tank, a receiver 18 inches in diameter and 11 feet long, and the boiler, pressure and circulation pumps, and accumulator necessary for operation. In all the existing methods of fireproofing wood the principal element is the receiver, which usually is built up of a certain number of lengths of massive cast or wrought iron pipe, and closed at one or both ends by gates, which are made extremely heavy to enable them to withstand the heavy hydraulic pressure that is necessary in the process. Owing to the large diameter of the pipe the accumulated pressure on these gates amounts to a great many tons, and extreme difficulty has been experienced, even with the lower pressures that are used in other processes, in preventing leakage. The doors are usually closed by a system of multiple-locking devices, and considerable time is taken in closing them and securing a water-tight joint. Difficulties that were considerable when pressures of 120 pounds to 170 pounds to the square inch were used, would have become insuperable in Mr. Ferrell's process, where pressures of from 200 pounds to 750 pounds to the square inch are ordinarily used, and where, in the treatment of some of the hard woods, it may be necessary to run the pressure up to 1,500 pounds to the square inch. Realizing that the hinged gate would be impracticable, it was decided to make use of a gate inserted within the pipe a few feet from its outer end, and the form of gate shown in the accom-

READY FOR FIRING.

AFTER TEN MINUTES' BURNING.

AFTER SIXTEEN MINUTES' BURNING.

Comparative Test of Fireproofed and Non-Fireproofed Wood.



Single-Cylinder Plant, with Capacity of 15,000,000 feet per annum.

FIREPROOFING WOOD.

panying illustration of the one-cylinder plant which is now being constructed at Long Island City was adopted. Near the end of the receiver is bolted a massive gate housing, which consists of a cast-iron chamber with a dome cover bolted upon it. Within this chamber the gate moves vertically, with a slight clearance, between vertical guides, its stem passing through a stuffing box in the top of the dome and carrying a small piston, which works within the vertical hydraulic cylinder shown above the dome. When the gate is closed its outer face is in close contact with a seating of phosphor bronze. When the liquor is pumped in and the hydraulic pressure accumulates within the receiver, this pressure, it will be seen, forces the gate into closer contact with its seating, any increase in pressure tending to secure a tighter joint.

In the plant which we inspected at Philadelphia, the opening or closing of the gate is accomplished in from five to seven seconds, and it was noticeable that under a pressure of 400 pounds to the square inch the joint was perfectly tight. The wood to be treated is placed within the receiver, the gate is closed, and the fireproofing liquor is allowed to fill the receiver by gravity, flowing into it from the filling tanks. As soon as the receiver is full, the pressure is increased by a Worthington high-pressure pump, the discharge pipe of which is connected to an accumulating cylinder that serves to cushion the shock of the pumps and prevent the wood under treatment from being bruised or otherwise damaged by the impact of the inflowing liquor. This accumulator was found to be an absolutely essential feature in the process, for Mr. Ferrell informs us that when pumping under pressures approaching 1,000 pounds to the square inch, without the accumulator the shock of the pump was sufficient, at times, to bruise the wood and even to split it asunder. The pressure in the receiver is allowed to rise to the predetermined point at which the saturation of the wood is to be accomplished. In the case that came under our personal notice, two planks of white pine, each measuring 1 inch by 8 inches by 13 feet, were placed in the receiver, and after the pressure had been run up to 400 pounds to the square inch, they were subjected to treatment for exactly ten minutes. The liquor commenced to penetrate the pores of the wood as soon as the pressure reached this point, and as it entered the supply of liquor was replenished by the action of the pumps. The extraordinary amount of injection that was taking place was shown by the sudden drop of the accumulator when the liquor first forced its way into the wood. After ten minutes' treatment the pressure valve was closed, and the liquor remaining in the receiver was pumped back into the tank. The receiver gate was then opened and the treated wood removed. The wood before its admission to the receiver weighed just 35½ pounds dry. On being withdrawn from the receiver it was again placed on the scale, and showed a weight of 69¾ pounds, making an absorption of practically 100 per cent. in ten minutes.

After the wood has been treated, it is kiln-dried, the moisture being evaporated and the salts deposited upon the walls of the cellular structure of the wood in the form of extremely fine salt crystals. When the kiln-drying is completed, the gain in the weight of the wood will be from 5 to 10 per cent., according to the treatment and the quality of the wood itself. The high pressures under which the saturation is carried out render it possible to secure saturation to the very heart of the wood, even when large sizes, up to 12 x 12, are being treated. This is, of course, an important feature, and, contrary to what might be expected, the enormously high pressures to which the wood is subjected do not appear to injure in any way its physical properties. Indeed, as a matter of fact, the laboratory tests show that the compressive and bending strength of treated wood is appreciably increased, while treatment does not in any way impair the ability of the wood to properly take paint, varnish, or polish, the specimens that were submitted retaining the native color of the wood and the varnished surfaces being fully equal to those of untreated specimens. The fireproofed wood is no harder to work with tools, although, as might be expected, the tools require more frequent sharpening.

The fireproofing liquor is non-corrosive, it is not volatile, and it is not hygroscopic; once the salts are distributed throughout the body of the wood and deposited on the walls of the cells they are, as far as exhaustive tests would indicate, indestructible and not removable. Specimens have been immersed for months in water, and exposed to the weather without losing their fireproof qualities.

The large plant which is illustrated on the preceding page is now being erected at 401 Vernon Avenue, Long Island City. The receiver, in this case, is 50 inches in diameter and 116 feet in length. It is built up of cast steel cylinders, whose walls are 2 inches in thickness. The cylinder bolts are 3 inches in diameter, and the bolts fastening the dome to the receiver are 3¼ inches in diameter. At the far end of the building is seen the pump for feeding the receiver, the liquor being delivered against the pressure of an accumulator. At the centre of the building stands a centrifugal pump that is utilized for returning the liquor from the receiver to the tank, while in front of it is a small Worthington pressure pump that is used for operating the lifting cylinder that raises the gate. This new plant will have a capacity for treating 15,000,000 cubic feet of lumber per annum.

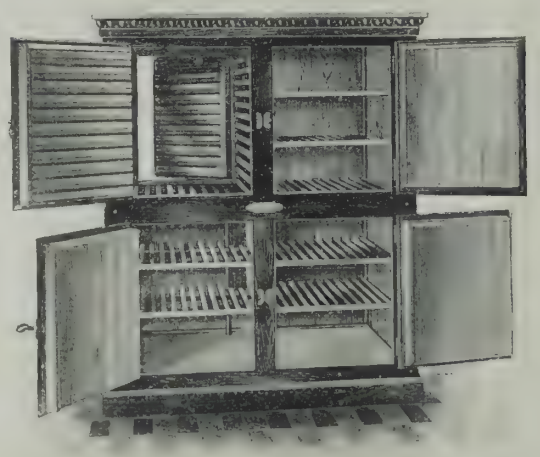
With regard to the cost of fireproofing, we have before us the figures for some structures in which fireproof wood has been used exclusively. In the case of a framed cottage at Sea Isle, whose total cost was $3,000, the cost of the wood $645, and the cost of fireproofing the same wood $1,050, making the cost of fireproofing 35 per cent. of the total cost of the house. In the case of a Colonial stone house at Germantown, which cost $14,000, the cost of fireproofing represented 18 per cent. of the total cost; while the fireproofing of the wood in a nine-story office building, whose total cost was $400,000, was only 1.7 per cent. of that amount.

A few simple experiments with the blowpipe suffice to prove beyond question the absolutely fireproof qualities resulting from this process. If a bunch of shavings of fireproofed wood are exposed to the flame of a Bunsen burner for ten or fifteen minutes, it is found that, while they are charred, they have not crumbled away, and that while the Bunsen flame will make a piece of treated wood glow to a cherry red, the instant the flame is removed the glow is extinguished under the action of the ammonia fumes from the salts. Shavings and sawdust of fireproofed wood may be soaked in benzine and ignited. The benzine will burn away, leaving the substance of the wood practically untouched. In fact, one might as well attempt to burn a bundle of asbestos as to burn a bundle of these fireproofed shavings.

We present a series of illustrations of a remarkable test made on two small wooden buildings, which was carried out at the shipyard of the New York Shipbuilding Company, Camden, N. J. The two structures were identical in size and construction, one, however, being built of untreated wood, and the other of wood fireproofed on the system above described. A considerable pile of resinous pitch pine was built around each structure and ignited. The progress of the fire is shown in the illustrations. It is sufficient to say that at the end of 16 minutes the untreated building was in ashes and the fireproof structure was practically uninjured. The fire was allowed to burn for 18 minutes more under the remaining structure, and it was then put out by means of a chemical engine. The door was opened and a box made of 1½-inch treated wood, and measuring 12 inches by 20 inches by 12 inches in depth, was placed in the middle of the floor. It was filled with a number of pamphlets and manuscripts, and the cover was screwed securely down. Sticks of pitch pine were then piled over it and the whole saturated with oil and ignited. At the end of 23 minutes' time the box was pulled out and opened, and the contents were found to be not even scorched. The wood of the box was charred only to a depth of about ⅛ of an inch, while the experimental house itself was not only intact but was very little charred. These tests confirm the thorough nature of this system of fireproofing as demonstrated by the smaller tests of the laboratory.

A NOVEL McCRAY REFRIGERATOR.

THE illustration which we present herewith is a special refrigerator built by the McCray Refrigerator and Cold Storage Company, of Kendallville, Ind., for one of its customers. In the construction of the refrigerator odorless wood lining is used, which, we are informed, is



A SPECIALLY BUILT McCRAY ICE-BOX.

as efficient as a tile lining. As our illustration shows, the refrigerator is far from being unsightly; and since McCray products are essentially useful, it may be inferred that the refrigerator is as serviceable as it is handsome.

Preservation of Timber.

PROBABLY little can be added to the stock of information and experimental data published on this question; but a paper published in the Transactions of the American Society of Civil Engineers, written by F. A. Kummer, Jr., Am.Soc.C.E., furnishes some interesting experiments on the subject. These were made with the view of improving what is known as the creosoting process, the author maintaining that this process would command a more extensive use if certain mechanical difficulties could be removed, especially in connection with railroad ties. The author points out how this creosoting process can be simplified, and at no greater cost. The Bethel process of creosoting is then described—i.e., of drying the timber naturally, then applying cold vacuum takes too long a time, or from three to six months for large timbers. Steam heat was introduced to hasten the drying, and the process is quoted from the publication of a company, one of the largest creosoting works in the world. The sap is extracted by means of large steam boilers and coils, and by powerful vacuum pumps, and the timber then impregnated with oil. The author gives two causes for the decay of timber. (1) The fermentation of its contained sap, by the germs developed in the sap; (2) The introduction of germs of decay from without, either by air or water. He says to treat a railway tie satisfactorily, it must first be sterilized throughout, removing at the same time as much of the contained moisture as possible without injury to the fibre. Fermentation cannot then take place from within. To prevent the germs of decay entering from without, the author injects an antiseptic. A sterilizing temperature of 212° at the heart of the stick arrests fermentation and is the first essential. Experiments made upon yellow pine ties 6 x 8 in. by 8½ ft., having self-registering thermometers imbedded in the heart of the timber by means of an auger hole 24 inches deep bored from ends, showed that with a temperature of 230° Fahrenheit in the cylinder and at the surface of the tie, 178° was secured in the centre in two hours; while with 290° Fahrenheit at the outside, 249° Fahrenheit was secured in the same time. If such a temperature can be used without injuring the timber, complete sterilization can be effected in a reasonable time. Long leaf yellow pine of the best kind was used in the experiments; white oak showed that it cannot stand the treatment, owing to its tendency to split and crack. The treatment adopted with the yellow pine is the application of pressure simultaneously with that of heat. The doors are closed and the heat raised 215° Fahrenheit without pressure, and this heat is maintained for one hour to get rid of moisture. Then the heat is increased, pressure is applied, and both raised gradually, to avoid injury to the fibre, for two hours, until the temperature is about 285° and the pressure about 90 pounds, and both are held for one hour. The heat is then shut off and the tanks allowed to cool gradually for one hour. The heat is then reduced gradually. Vacuum is then applied until 26 inches is reached, and the mixture is run into cylinder at a temperature of 175° to 200°, and hydraulic pressure applied up to 200 pounds per square inch, and kept so until the mixture is absorbed. The liquid is then run off, and the wood placed in another cylinder, and milk of lime at 150° run in, and hydraulic pressure again applied at about 200 pounds for about one hour. The preservation fluid used is not creosote or dead oil of tar alone, but 38 per cent. of latter, 2 per cent. of formaldehyde, and melted rosin 60 per cent. by weight. This thoroughly fills the pores of the wood, and excludes air and moisture. The action of this preparation is both antiseptic and waterproof. The combination of the rosin, creosote oil, and formaldehyde prevents the entrance of all bacteria. The author gives tables of experiments on pine ties and other data. Ties treated by this process are said to be thoroughly sterilized; the outer fibres are filled with antiseptic and waterproofing material, which resists crushing when hard, and the spongy nature of ordinary creosoted timber is avoided. The treated timber is not only hard on surface, but has a higher spike-holding quality than the usual tie—an advantage of considerable importance for railway ties. The same process can be applied to piles and dock timbers so often now attacked and injured by the teredo and the action of salt water. Pine paving blocks can also be rendered imperishable and hard by the same process. Why cannot constructional timbers generally be treated by the same process before they are framed together? Ground-floor joists ought always to undergo such a method of preservation as a certain preventive of the dry-rot. The destructive fungus generally originates with the half-seasoned joists of damp and air-tight floors and cellars. The encased timbers of our floors, especially those ceiled, are soon susceptible to early decay, owing to the processes of fermentation that commences after the timber is cut. The extraction of the sap from these timbers ought not to be difficult if special cylinders were made for them. Exposed timbers are always most safe in this respect. With our modern patented methods of encasing beams in slag-wool or plaster, we are undoubtedly increasing the risks of rapid decay. We do so to preserve the timber from a more rapid consuming agent; but our efforts to protect timber from fire expose them to another and more insidious enemy, so that one cure aggravates another disease. By a mode of sterilizing the fermentive juice, and by injecting an antiseptic solution into the pores of the wood previously exhausted, the danger of the latter is removed. We all know, too, the effect of painting green timber—how quickly the disease of dry-rot attacks it; but by this process the internal condition of the wood is quite altered.

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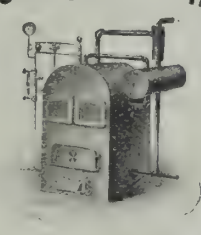

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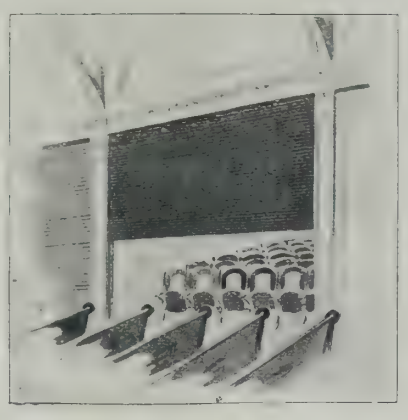

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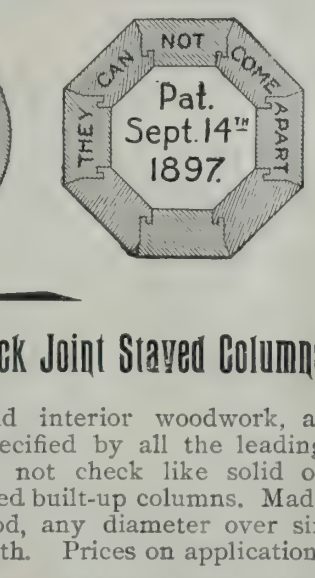

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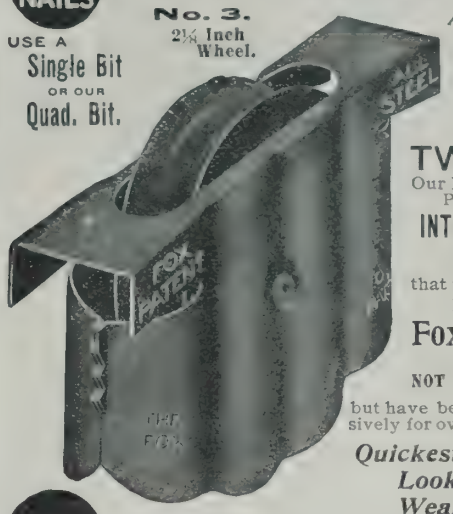

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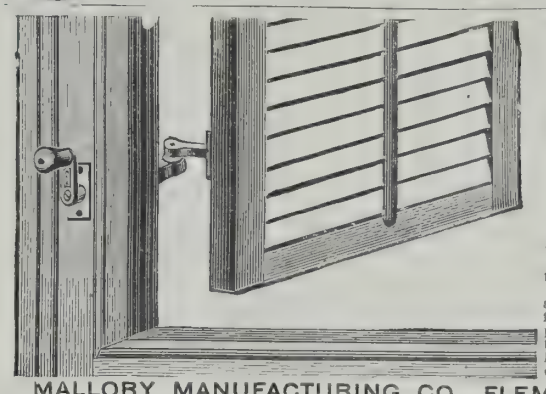

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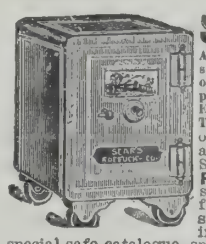

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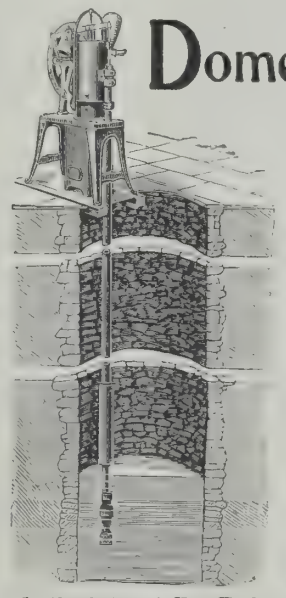

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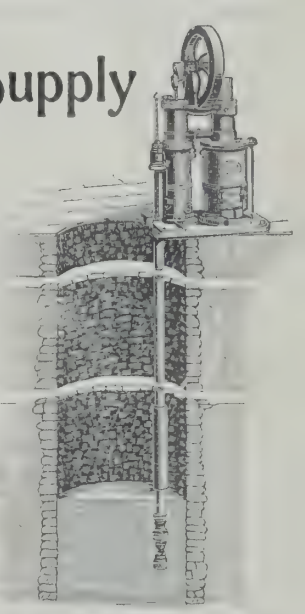

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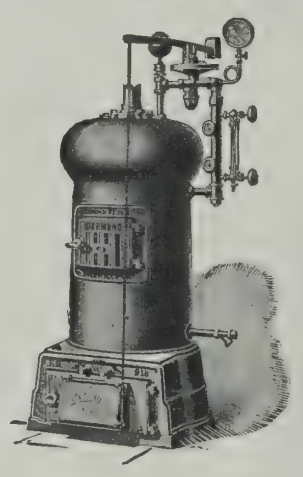

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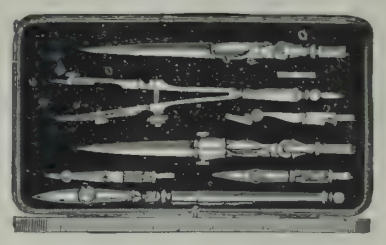

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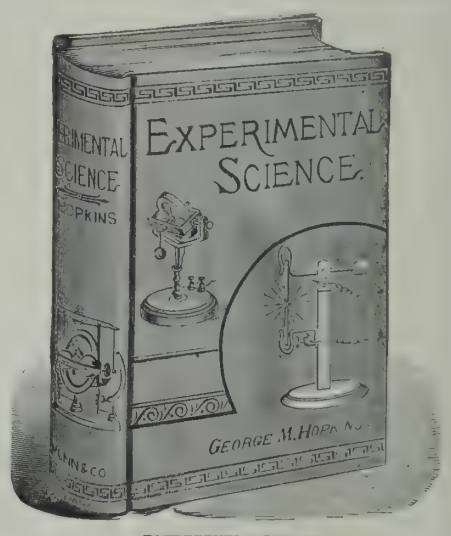

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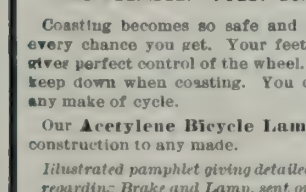

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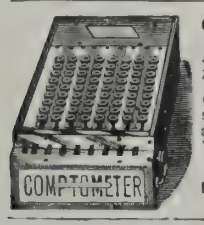

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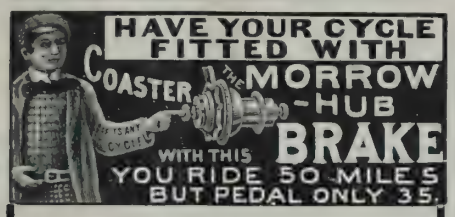

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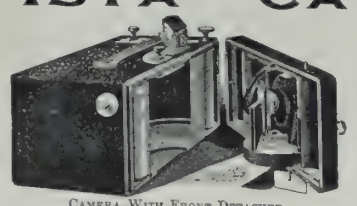

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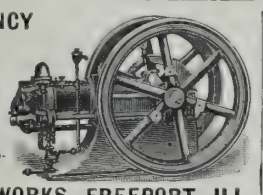

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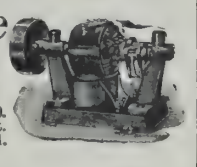

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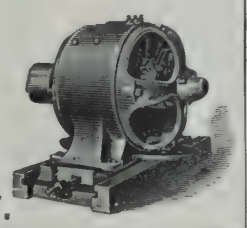

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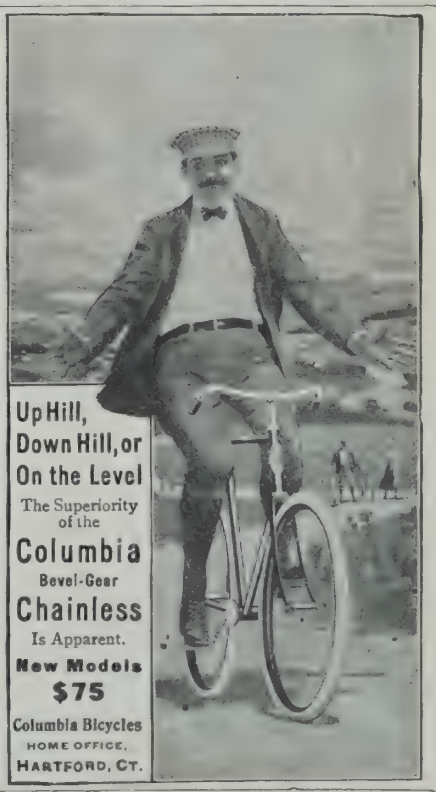

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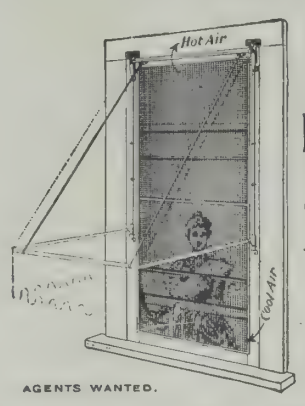

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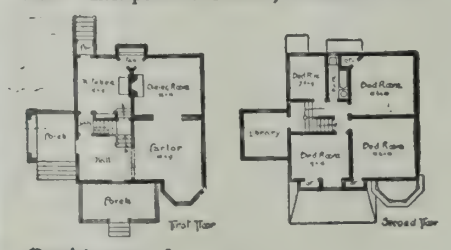

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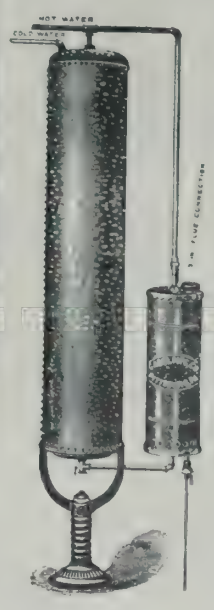

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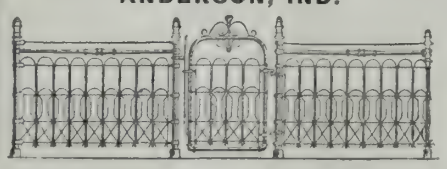

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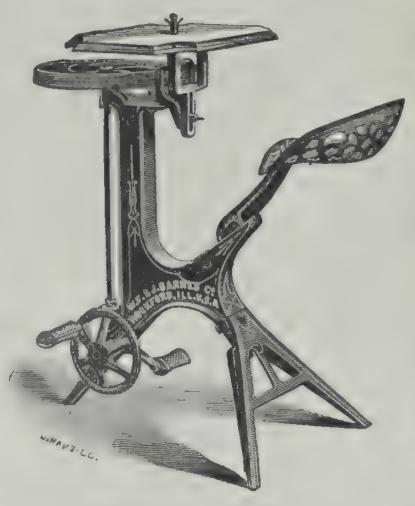

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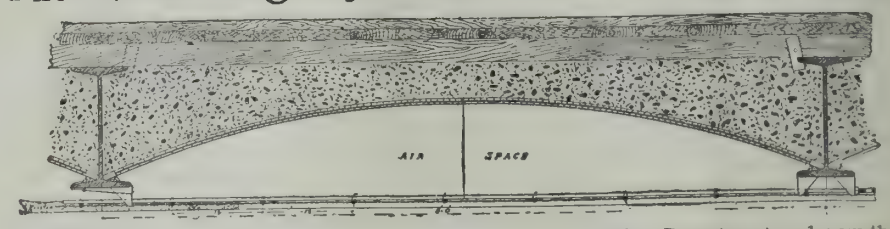

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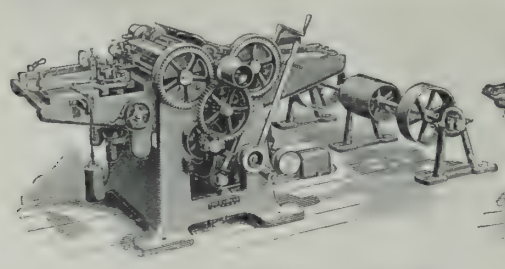

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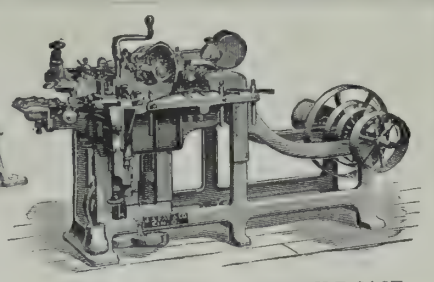

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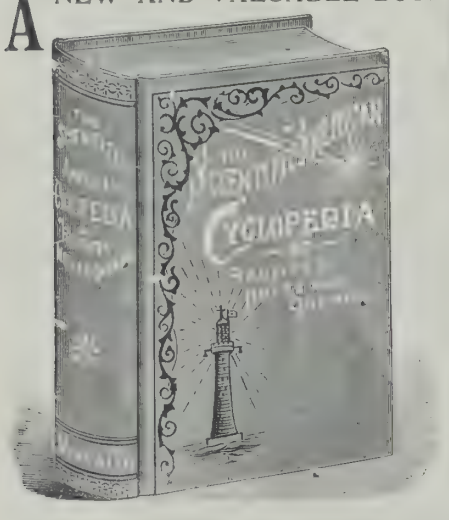

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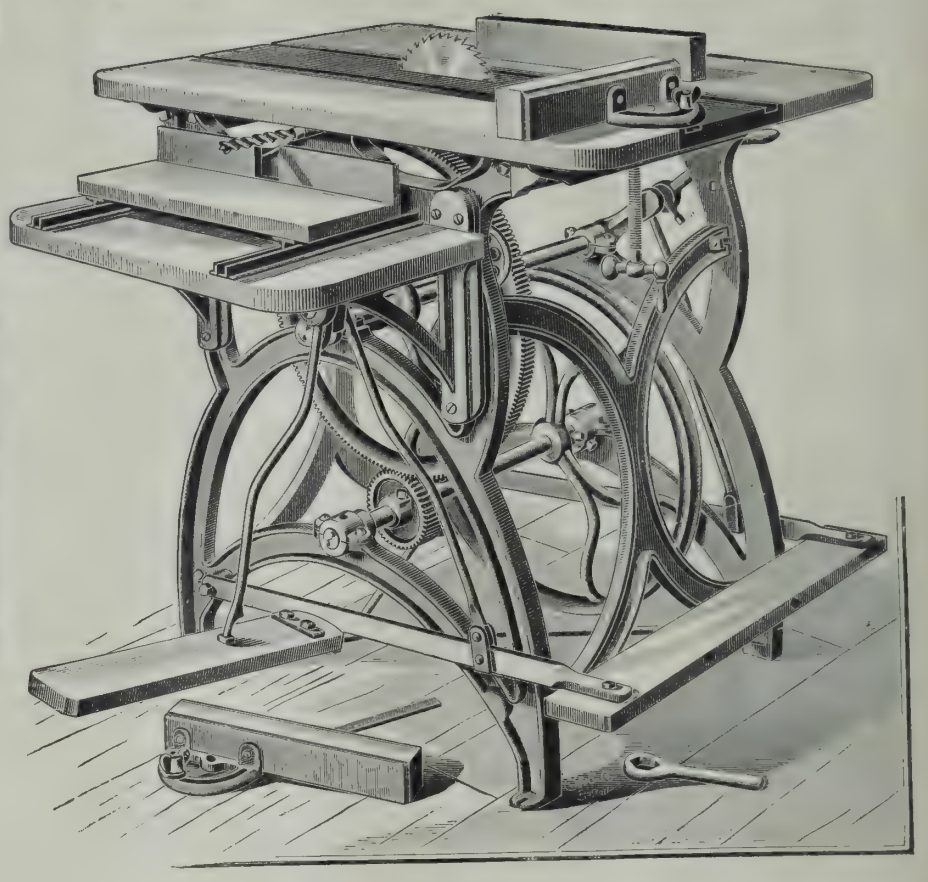

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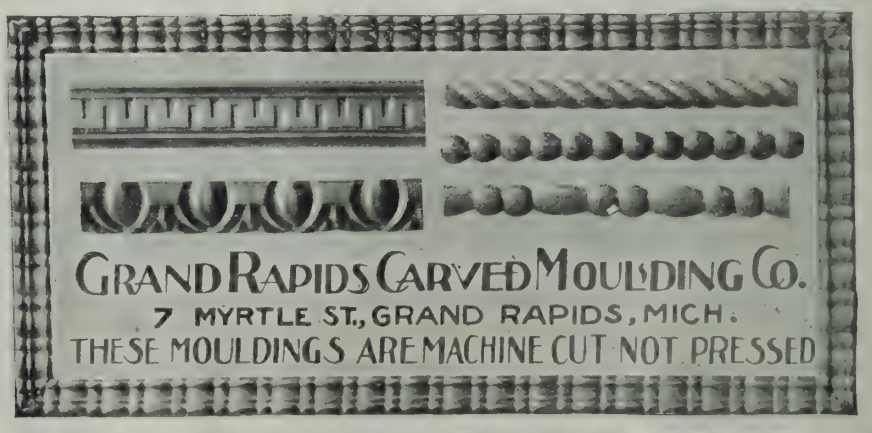

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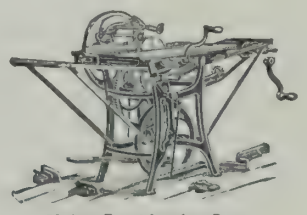

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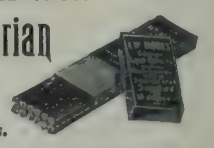

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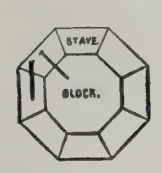

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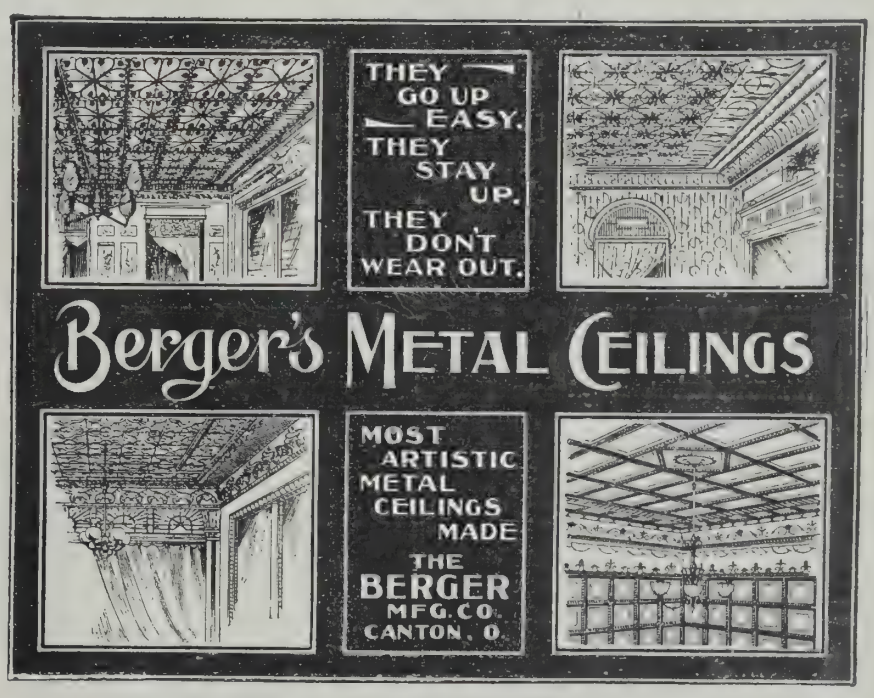

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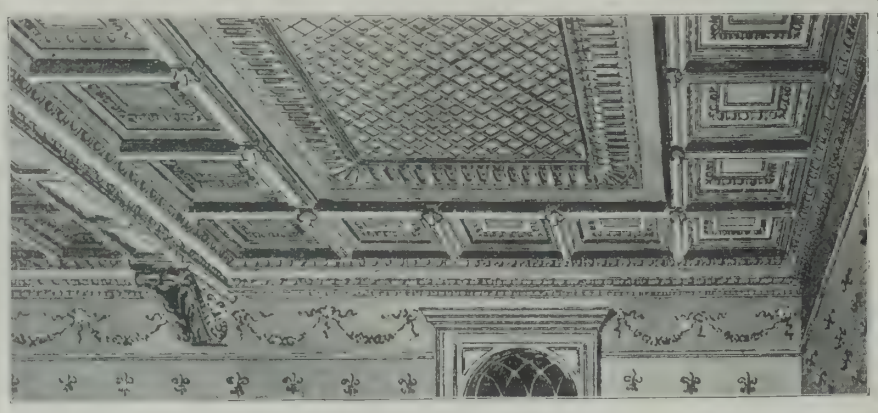

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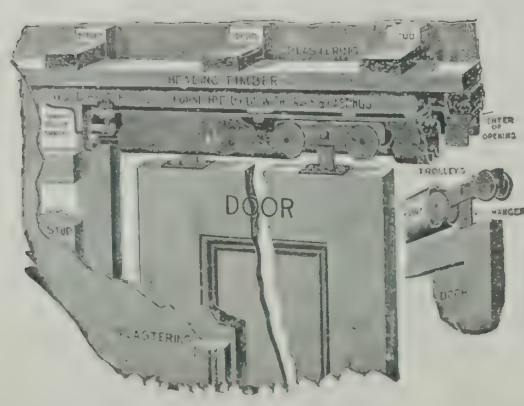

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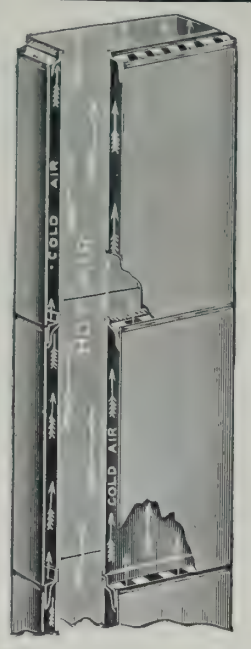

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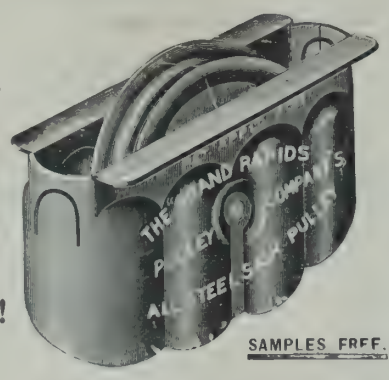

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THE ARTISTIC GROUPING OF GOVERNMENT BUILDINGS.

THE tendency during the past ninety years to locate Government buildings and statuary according to the taste of individuals has been a great misfortune to the art interests of this country. The selections of designs and sites for buildings and statuary have been carried on during this period without a definite plan, and without taking into consideration the great advantages which would accrue by proper and artistic grouping. The whole subject is admirably summed up in a recent number of the Architectural Review, in which Mr. Glenn Brown makes some pertinent remarks, and illustrates his article by admirably selected photographs, well produced. He says that in Washington the parks have been used to save the expense of building sites. The structures have been placed directly on the street in many instances, so as to utilize the total area of the ground. An endeavor to group and harmonize the buildings with the surroundings does not appear to have presented itself to the minds of any of the separate departments which have charge of such work. The appropriations made by Congress are expended through many departments, each of which is a law unto itself, although in the last few years it must be said that juries composed of experts have been called in to advise; but in some instances, as in the selection of the Sherman statue, expert advice was overruled by laymen. The original plan of the city contemplated, as one of its principal features, permanent buildings, forming a centre from which the avenues radiated; but not much attention seems to have been paid to this matter, for the Treasury and the War, State, and Navy buildings have been so located that they interfere with the vistas of the Executive Mansion. The view of the White House from the Capitol is completely cut off by the Treasury Building, and a similar vista has been destroyed by the huge State, War, and Navy Building. Even the Congressional Library, says Mr. Brown, has been so placed that it produces a decided discord with the Capitol. From the west, the dome of the Library, as viewed from the Mall, is apparently a gilded dome on one wing of the Capitol. The view down Pennsylvania Avenue toward the east has been destroyed in a far more serious way; the Library dome on one side and the dome of the Capitol on the other makes a complete jumble of architectural features.

The original plan of the city contemplated a monument to George Washington on the intersection of the eastern and western axes of the Capitol and the western and southern axes of the White House, but when it was commenced it was located 100 feet south of the axes at the Capitol, and 500 feet east of the axes of the Executive Mansion. The scheme laid out by Washington and L'Enfant would have made a most satisfactory solution of the problem. A boulevard beginning at the Capitol and ending at this monument, a distance of a mile and a half, would have been very magnificent. Looking from the boulevard across the park a continuous line of buildings was to have formed the background. They were not to have been deep enough to curtail the natural and artistic beauties of the park nor to encroach upon the people's rights to air space. By this time such avenues, had they been laid out, would have obtained a world-wide reputation had the work been accomplished by the aid of competent architects, landscape artists, etc.

The year 1900 being the hundredth anniversary of the establishment of the seat of the Federal Government in Washington, and suitable measures being taken to commemorate the event, a committee was formed which determined to advocate a boulevard through the Mall. It was proposed to run the boulevard diagonally through the Mall to the proposed site of the Memorial Bridge which is to cross the river to Arlington on the line of New York Avenue. Mr. Brown considers that this plan would cut the Mall in the most unfortunate manner. He considers that the Government buildings would probably be located in future along this boulevard in the park, destroying the beauty of it and making practically another street without balance, symmetry, or good vistas.

Some of the unfortunate effects which interfere with the artistic appearance of the buildings in the parks are the character of the structures—as, for example, the Army Medical Museum and the Astrophysical Observatory. A boulevard through the Mall would not necessarily destroy the park, but might enhance the effect and bring into harmony many of the fine structures already in existence. Mr. Brown suggests that a boulevard could run through the Mall on the Capitol grounds to the Monument, with the Capitol as the vista on the east and the Washington Monument on the west. Leaving the Monument, the boulevard could extend to the river and cross the new Memorial Bridge to Arlington. The Monument at present, although an object of beauty in size, color, and proportion, lacks ornamentation and interest, as well as something to give it a scale from a near standpoint. Mr. Brown proposes a grand circular colonnade, 800 feet in diameter, but detached therefrom, leaving a plaza between the colonnade and the Monument of more than 700 feet in diameter. The colonnade contemplates seats around its whole circumference, overlooking the plaza which surrounds the Monument. In this plaza formal parades, presentations, presidential reviews, etc., could be viewed by the populace. The colonnade would seat between 20,000 and 25,000 people. Triumphal arches flank the east and west portals to the colonnade, and are surmounted with appropriate figures on top. After passing the Monument the scheme proposes to continue the boulevard, with its statuary, on either side to a point near the Potomac River, and another circular plaza surrounded by groups of statuary forms the entrance to the Memorial bridge, which will be built across the river to Arlington. This scheme changes slightly the proposed location of the bridge, so as to bring it on the axis of the boulevard. The vista down the boulevard, with the Monument in the foreground and the Capitol at the end, flanked on either side by green trees and shrubbery, monuments and statues, could not fail to give a charming view. The disturbance by the new boulevard would not be serious. At several points street-cars would pass, but the difficulties connected with the laying of tracks could be avoided by raising the boulevard slightly and lowering the streets a trifle. A tidal reservoir which is now located on the reclaimed ground could be turned into a formal basin, treated on three sides with a balustrade. In the northern portion could be placed a large group of fountains and statuary, while the smaller basin could be treated in a classical design with steps and platforms, which could be used in summer as a swimming pool, and in winter as a skating pond. The most difficult problem connected with the artistic treatment of the Mall is the fact that the Pennsylvania Railroad runs through the grounds. Several ways suggest themselves of treating this rather serious problem. One is to depress the tracks, and another is to place the depot on the southern end of the boulevard, with an entrance at the boulevard level, and other entrances below on the street level, so that all street-car lines, cabs, and heavy traffic could pass down Seventh Street, turn under the Boulevard, and go out through Sixth Street.

The Government has reclaimed 700 acres of marsh land, adjoining the Mall on the south, and roadways could pass directly into this riverside park. This park would lend itself to a treatment of broad and quiet effects. The combined area of the various parks is something less than 2,000 acres. To bring about a satisfactory result, Mr. Brown considers that a carefully selected commission of architects, sculptors, and landscape architects should be given charge of the subject—men in love with art and nature and having pride in the capital of their country.

SCHOOL ARCHITECTURE IN NEW YORK.

A FEW years ago the school buildings of New York City were conspicuous by their ugliness. Most of them were built after Italian Renaissance models, and the mass and detail were both bad, and the structures themselves were not particularly adapted for their purposes. In Italian buildings the window surface is reduced as far as possible, the intention being to keep out the light. Gothic architecture, however, is extremely well suited to schoolhouses, because it permits of wide stretches of windows and admission of an abundance of light, for Gothic buildings were erected originally in northern countries where the sun is welcomed.

In 1891 Mr. C. B. J. Snyder, an architect, became Superintendent of School Buildings, and it is to him that we are indebted for a large number of new edifices, which are not only well adapted for their purposes, but are excellent from an architectural point of view. The old buildings have depressing exteriors, and, as we have already said, the rooms are dark and the sanitary conditions were not of the best. To-day the buildings all have ventilating plants and good sanitation and conveniences of all kinds. In the new buildings red brick with brownstone trimmings, which were the chief materials used in the old schools, have given way to limestone, red sandstone, and fancy-colored bricks, and slate and tiled roofs, resulting in some excellent bits of color. Mr. Snyder obtained a hint for the new H-shaped buildings which have proved so successful from the Hôtel Cluny, in Paris. The H-shaped building is particularly adapted for sites which are in the middle of a block, and which extend through from one street to another. All of its windows open on a street or open court, the side walls being blank. With this plan the erection of buildings on adjoining lines can never cut off light and air from the school. Some of the new schools have their own electric light plants, and have gymnasiums, manual training rooms, large lecture and entertainment rooms, playrooms, etc. The new schools represent the best practice of the leading sanitary engineers. The children's clothing is kept in special rooms, and each child's articles of clothing are separated from those of other children by a coarse wire netting, which admits of a free passage of air around them. The seats and desks are made adjustable, and the raised dais for the teacher is now largely done away with, and her seat is raised but little above those of her pupils. Double stairways are used, which permit of a double line of children passing up or down at the same moment. The new schools cost on the average from two to three hundred thousand dollars, and, strange to say, they cost less per square foot than did the old schoolhouses of twenty years ago. There are at present in the Boroughs of Manhattan and the Bronx 180 schools, including those now under completion, and more than 200,000 pupils are enrolled.

A MODERN DWELLING AT UPPER MONTCLAIR, N. J.

THE engravings shown on page 64, in this issue, illustrate a modern dwelling, which has been completed for H. M. Bingham, Esq., at Upper Montclair, N. J. The design is treated in a pleasing style, and is most harmonious in all its detail, including the lean-to roof effect, sweeping down and forming roof for porch, the treatment of windows and bay windows, and the massive chimney giving a touch of solidity, while the whole is very much enhanced by the beauty of its natural surroundings. The building is of wood, and the exterior framework is sheathed, covered with paper, and then furred, lathed, and plastered with stucco, composed of "Absene" cement, and brushed on so as to leave a very rough surface, the whole being left a pearl gray in color. The beams and all trimmings are painted ivory white. The roof is shingled and painted a deep red. The chimneys are built of red brick. Dimensions: Front, 42 ft.; side, 49 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The entrance is into a large living-room, which is trimmed with yellow pine and finished natural. The walls have a paneled wainscoting and the bay window a paneled seat. This room has a highly polished hardwood floor, and contains an open fireplace built of brick, with terra-cotta facings, and a hearth laid with square red Dutch tiles. Circular arches open into parlor and staircase hall, the latter containing stairs rising to second story, with rail, newel posts, and balusters. Stairs descend beneath these stairs to a side entrance and also to cellar. The parlor and dining-room are treated in ivory white, and the former contains an open fireplace similar to the one in hall, with neat wooden mantel, and is provided with seats on either side of fireplace, with circular arches thrown over same in an artistic manner. The dining room has a plate rail running around room, and it also contains a china cabinet built in, with drawers in the lower part and cupboards above, with leaded glass doors. The butler's pantry and kitchen and its apartments are fitted up in the most complete manner with all the necessary conveniences. Room for ice-box with outside entrance thereto is provided. The second floor is treated in ivory white, has hardwood floors, and contains four bedrooms and bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains servant's room, one guest room, and trunk-room. A cemented cellar contains laundry, a John Hyslop furnace, and other necessary apartments. Cost, $5,500, complete. Messrs. Rossiter & Wright, architects, 95 Liberty Street, New York. Messrs. H. D. Matthews, builder, and D. E. Moore, mason, of Orange, N. J., were the contractors, and Messrs. Fentzloff & Wolf, of Upper Montclair, did the plumbing.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

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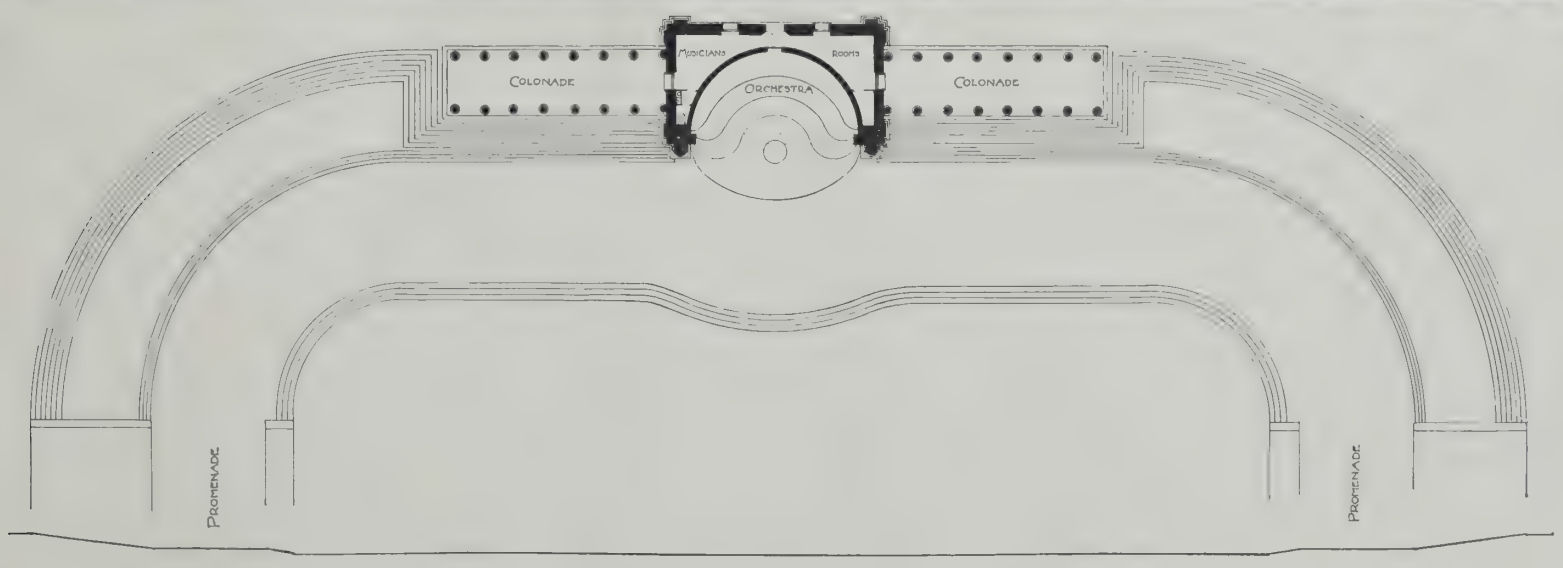
THE NEW "CLAUS SPRECKELS" MUSIC PAVILION, SAN FRANCISCO, CAL.

GOLDEN GATE PARK, San Francisco, has been further enriched by a music pavilion of conspicuously beautiful design and substantial construction, presented by Claus Spreckels, the "Sugar King" of the West, of which we present an illustration below. The pavilion was dedicated with much ceremony on September 9, in the presence of a vast concourse. It is located in a valley, sheltered from the prevailing ocean winds at the foot of Strawberry Hill and Stow Lake, in a situation where the finer attractions of the beautiful park are concentrated within a comparatively limited space. The pavilion stands facing a court 400 x 800 feet in dimensions, surrounded by carriage and bicycle drives and a wide promenade for pedestrians. The court is planted with shrubbery and shade trees, and seats are provided for 20,000 people. At least five times as many may find standing room within hearing space. The music pavilion itself stands upon the summit of an elevated mound, reached by a succession of terraces fourteen steps in height, and is built upon a foundation of concrete 12 feet in depth. It consists of a main arch, 35 x 56 feet floor dimensions, with a total height of 72 feet. From either side colonnades 17 x 54 feet, and 36 feet in height, branch to the left and right. In the centre of the main arch is the space alloted for the musicians, which has a width of floor space of 45 feet, and an interior elevation of 50 feet, the ceiling being arched and designed so as to project the sound. Back of the space occupied by the musicians are the rooms for library, toilet, rehearsal, and refreshment purposes. The entire structure is constructed of native California sandstone, in color a bluish gray, resembling Texas granite, with a texture hard and close-grained. The design is purely classical. The capitals of the colonnade columns are Ionic, with enriched cornice and open balustrade on top. The columns of the main arch are Corinthian, with carved architraves above and broad projected main cornice supported on carved medallions, with dentil course and bed molding following strictest classical usage. Above is a solid balustrade of masonry, with unornamented front designed for future treatment with bas relief or inscription. Spandrels on either side of top of orchestral arch have been appropriately filled with sculptured subjects, with music as the motive. It is believed that this costly and beautiful pavilion is unequaled either in Europe or America. The architects are Reid Brothers, of San Francisco.

Our engravings were made directly from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.



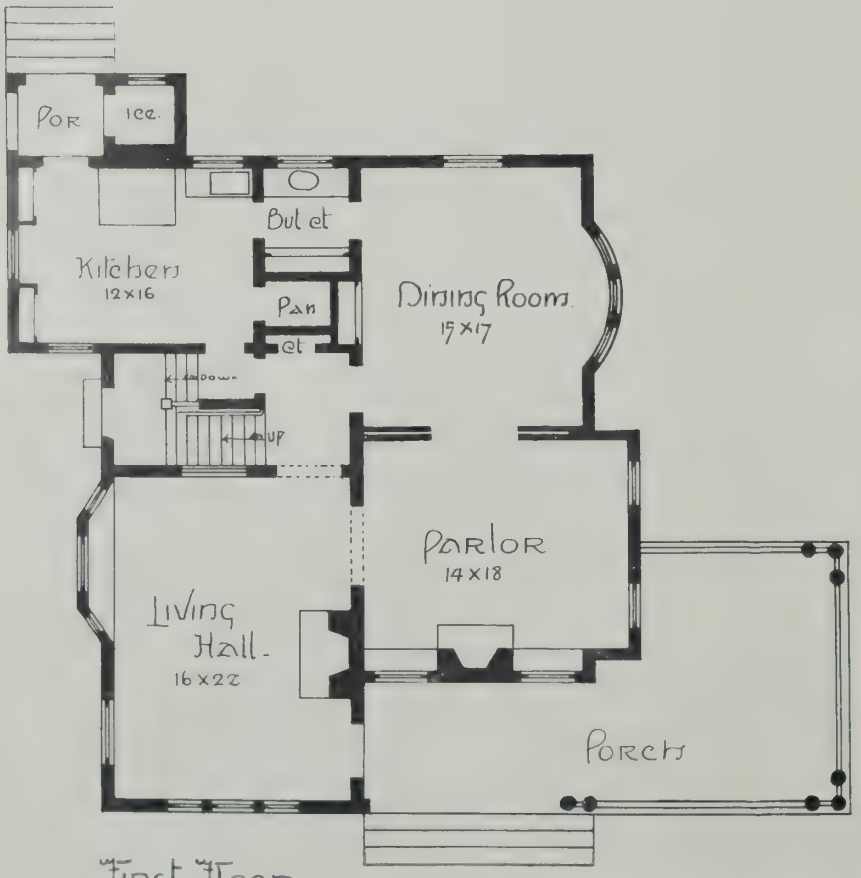
SECTION

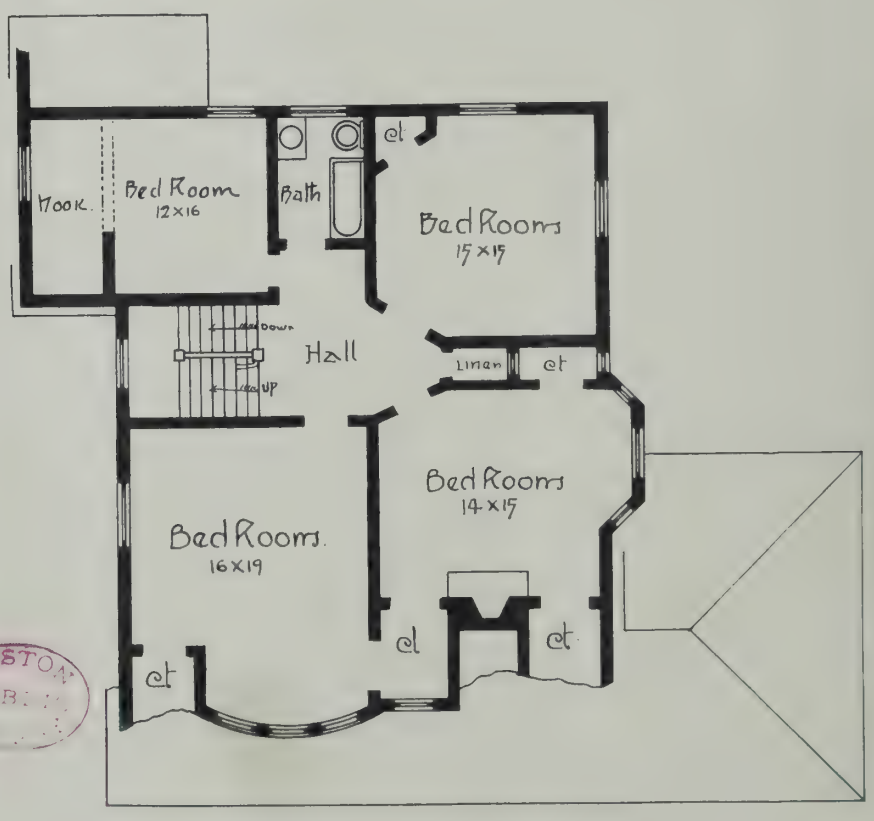
THE NEW "CLAUS SPRECKELS" MUSIC PAVILION, GOLDEN GATE PARK, SAN FRANCISCO, CAL.

A DUTCH COLONIAL HOUSE AT WORCESTER, MASS.

WE publish on page 70, in this issue, a Dutch Colonial cottage, which has been erected for Mrs. Calvin Taft, at Worcester, Mass. The gambrel roof with its sharp gabled dormers, combined with the dark green shingle stain, and white blinds and trimmings, produce a striking effect. Dimensions: Front, 27 ft. 6 in.; side, 36 ft. 6 in., not including projections and verandas. Height of ceilings: Cellar, 8 ft.; first story, 8 ft. 6 in.; second story and attic, 8 ft. The interior is very compactly arranged, and the rooms are ample size and well finished. The reception hall and library are finished in white enamel, and are connected by a wide portière opening. The corner fireplace in the reception hall produces a pleasing effect upon entering the house. The dining-room, connected with the library by sliding doors, is finished in cypress with a birch floor, and contains a bay window seat, and recessed china cases, at either side of the pantry door, enclosed by fancy glazed doors. The kitchen, pantry, etc., are finished in hard pine. The finish in the second story is painted, with the exception of the bathroom, which is stained in imitation of oak. This latter is wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The chambers are large, well lighted corner rooms, and are provided with ample closets. The attic contains a servant's chamber and a large unfinished storage-room. The laundry is located in the basement, and the remaining space is devoted to the heating apparatus. Cost, $3,400, complete. Mr. Lucius W. Briggs, architect, 452 Main Street, Worcester, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.





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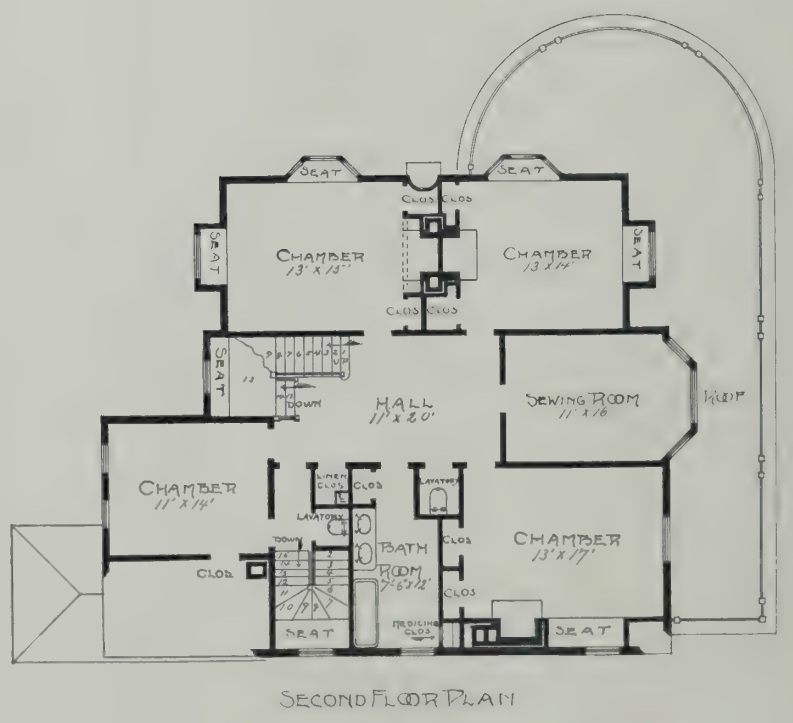

SECOND FLOOR PLAN

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A DUTCH COLONIAL RESIDENCE AT MELROSE, MASS.—See page 77.

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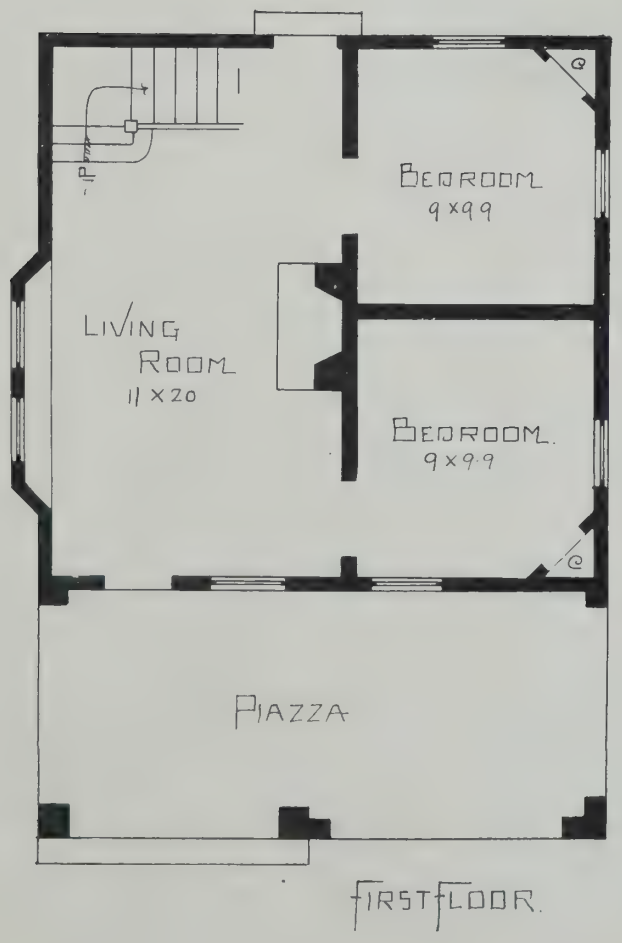

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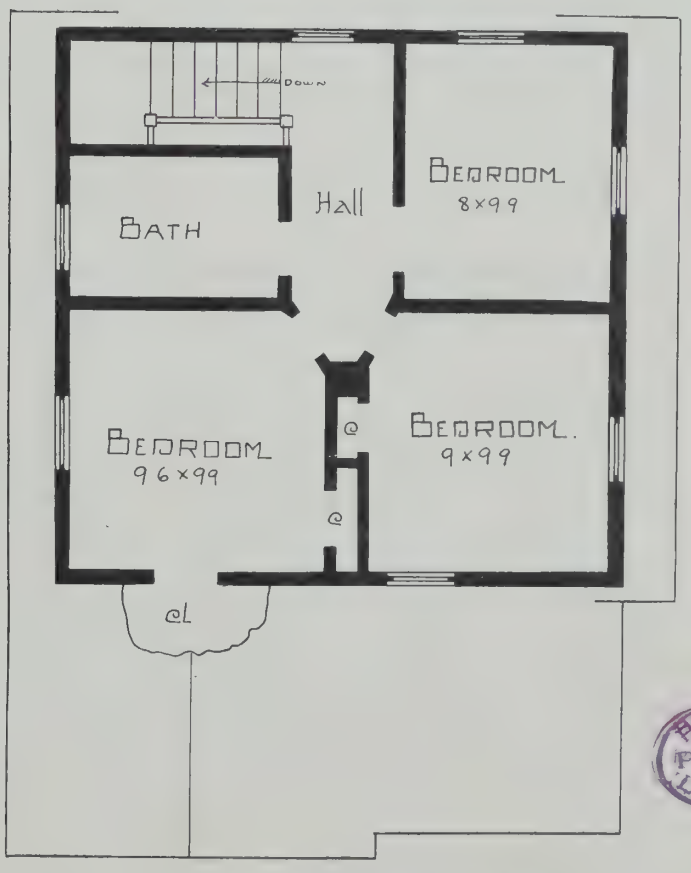

SECOND FLOOR.

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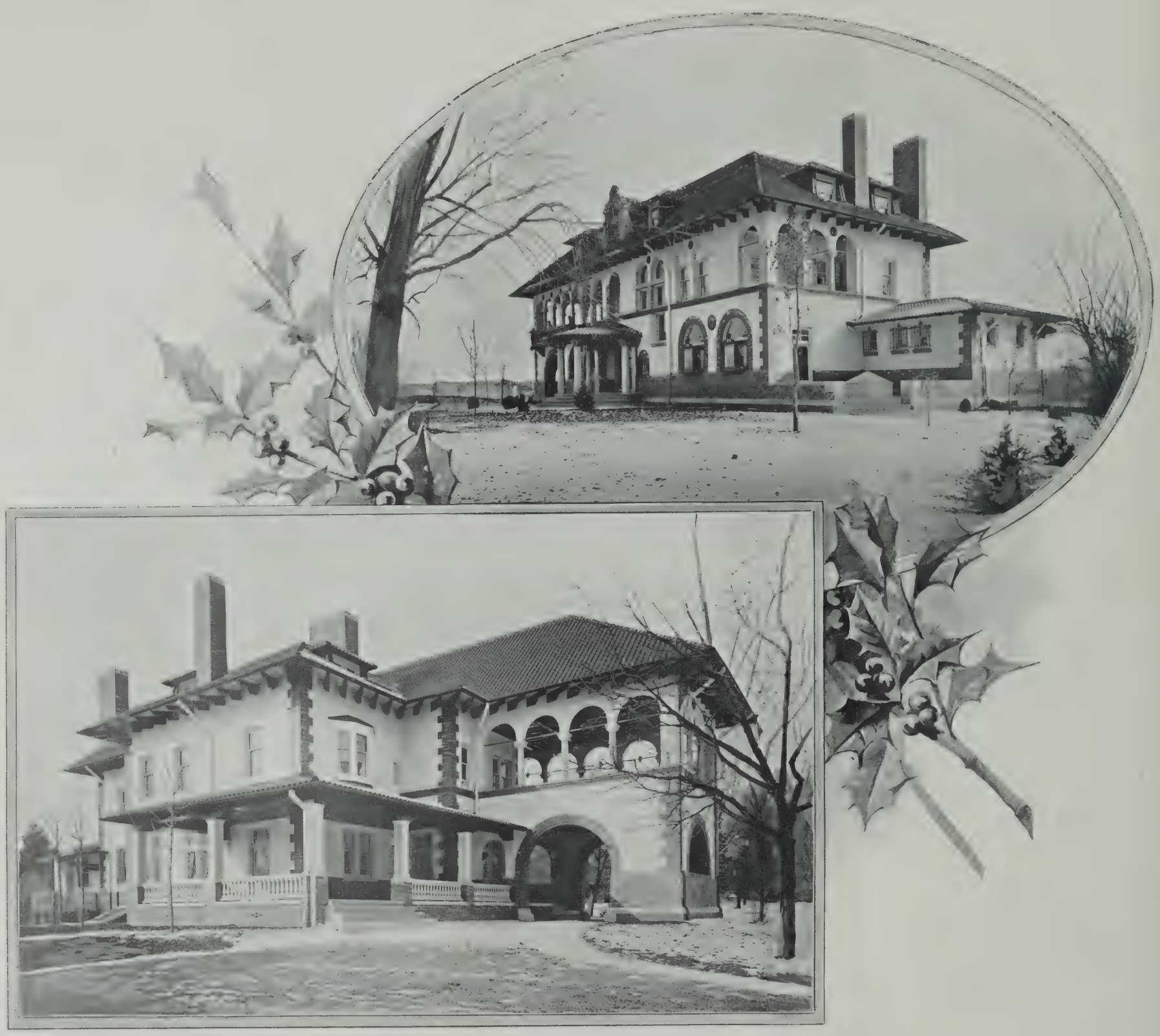
MR. WILLIAM G. MASSARENE, ARCHITECT.



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A RESIDENCE AT OGONTZ PARK, OGONTZ, PA.—See page 76.

MESSRS. KEEN & MEAD, ARCHITECTS.

A RESIDENCE AT OGONTZ PARK, OGONTZ, PA.—See page 76.

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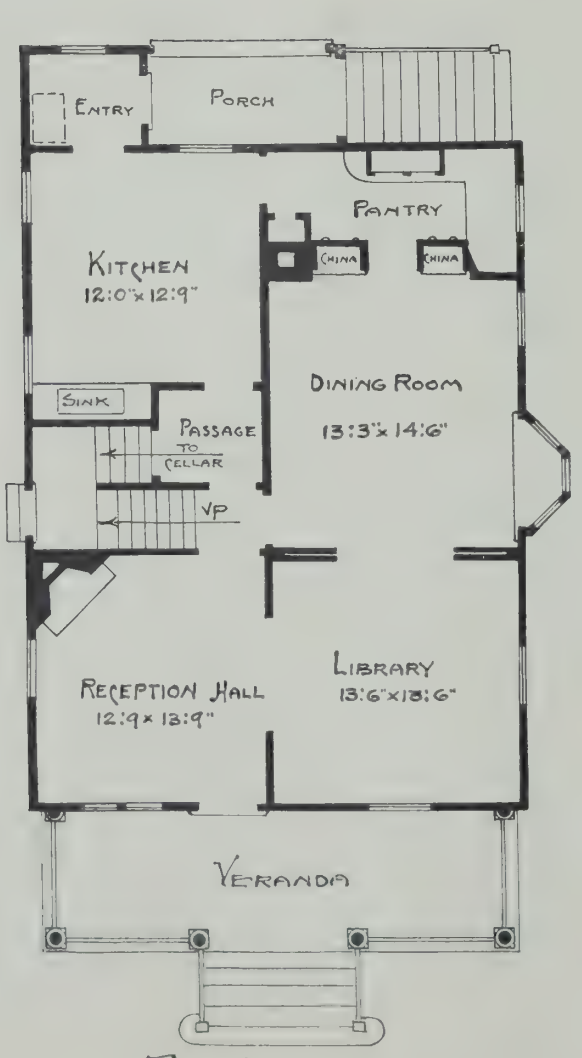

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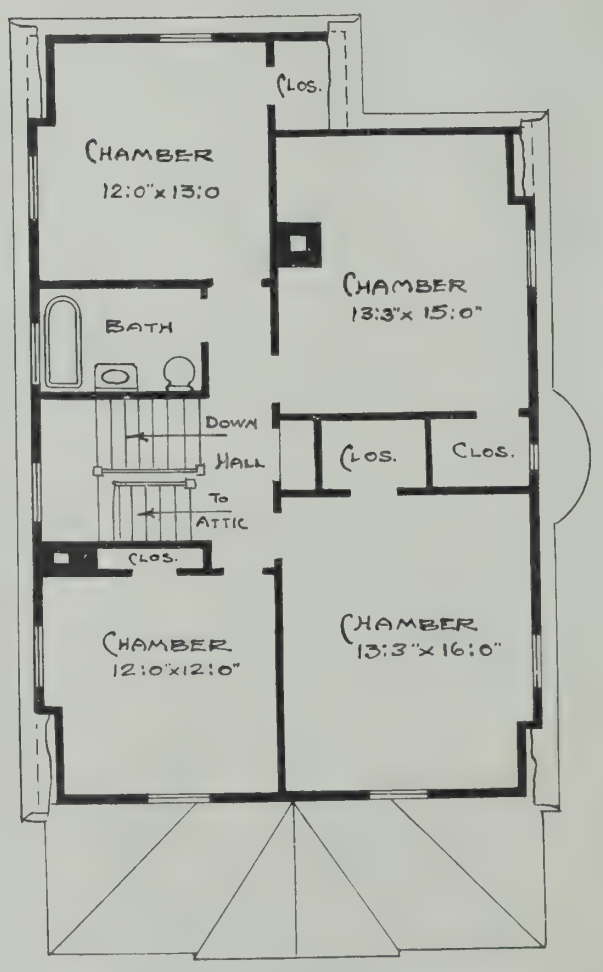
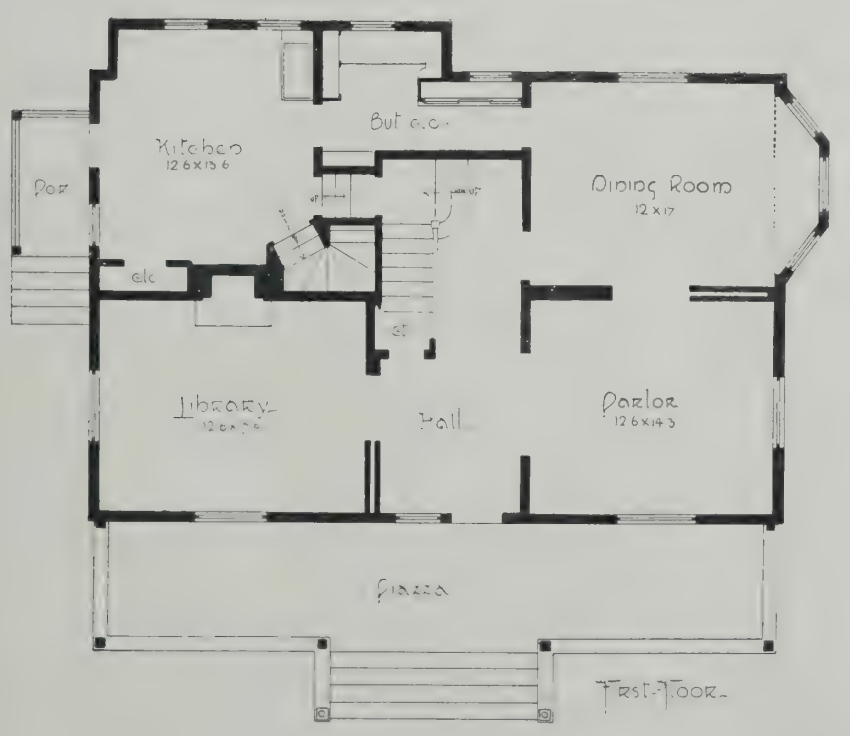
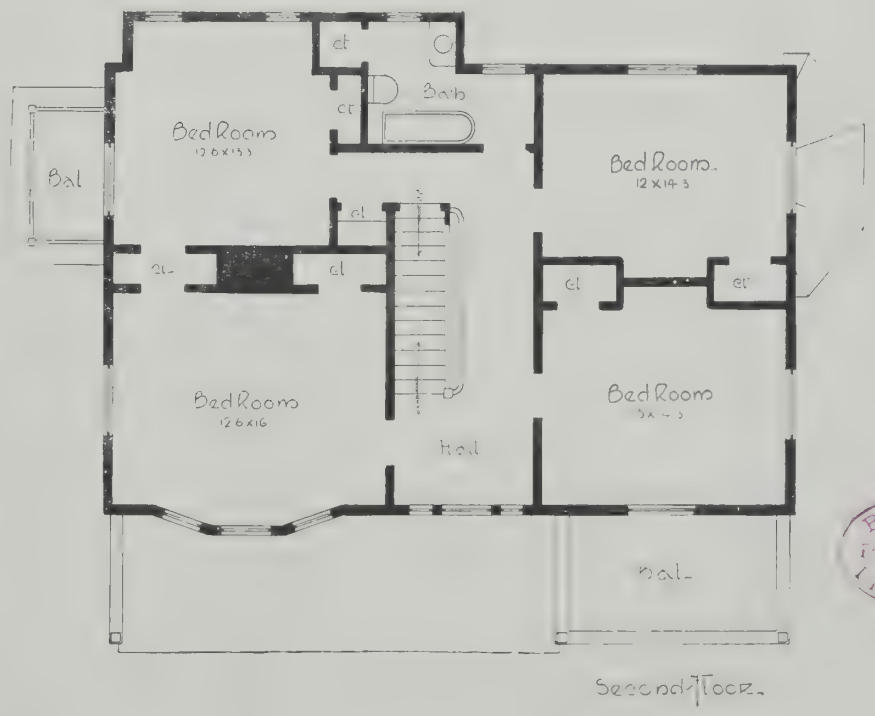


Second Floor Plan

A DUTCH COLONIAL HOUSE AT WORCESTER, MASS.—See page 63.

MR. LUCIUS W. BRIGGS, ARCHITECT.



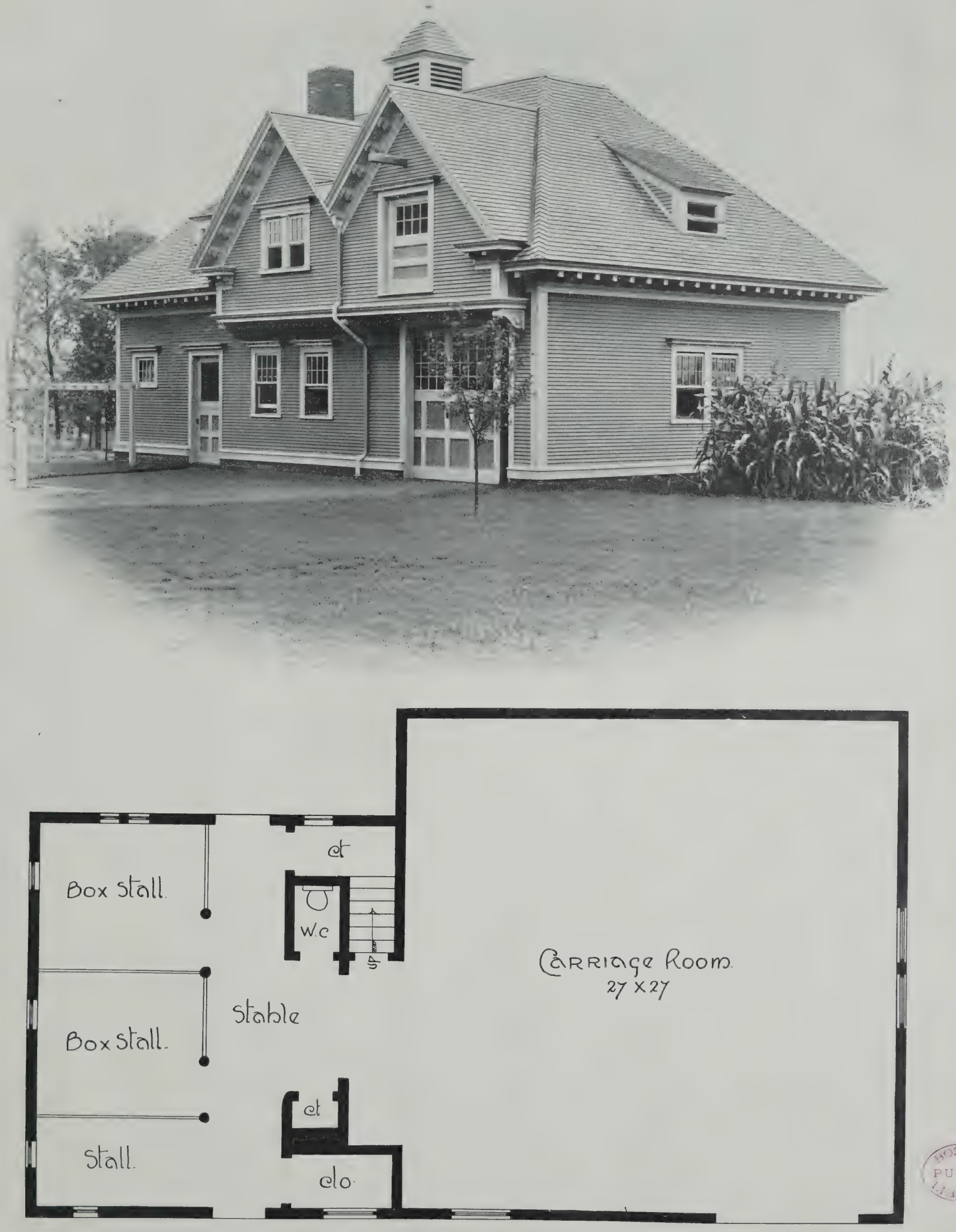


A MODERN DWELLING AT SPRINGFIELD, MASS.—See page 76.

ERECTED FOR THE FOREST PARK HEIGHTS LAND CO.

A RESIDENCE AT SPRINGFIELD, MASS.—See page 77.

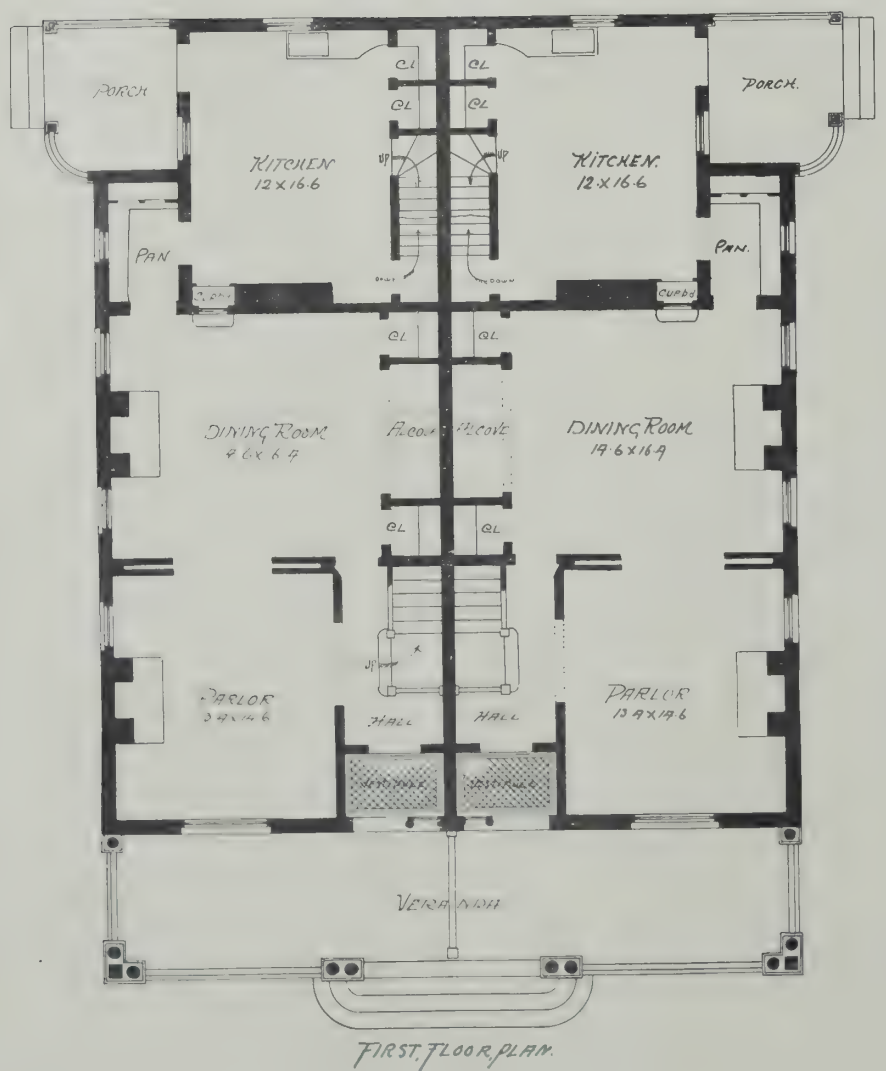
MR. G. WOOD TAYLOR, ARCHITECT.



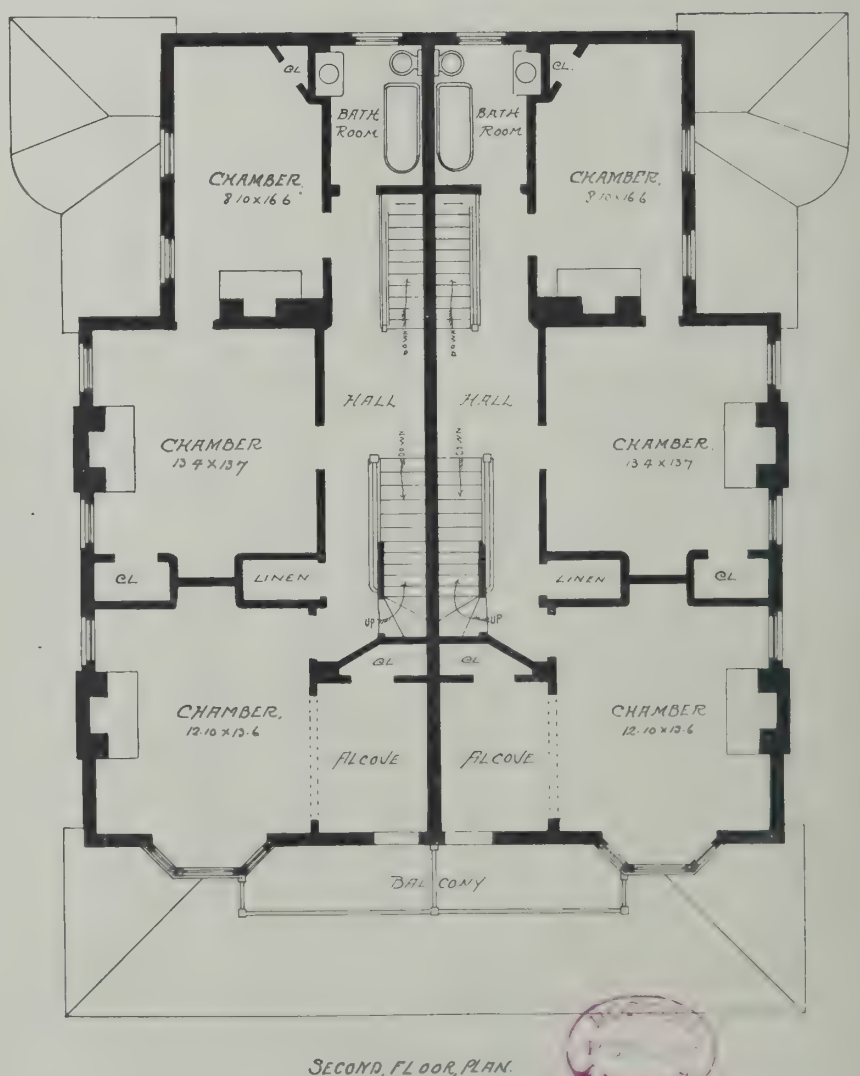
Ground Plan.

A MODERN STABLE AND CARRIAGE HOUSE AT SPRINGFIELD, MASS.—See page 77.

MR. G. WOOD TAYLOR, ARCHITECT.



FIRST FLOOR PLAN.



SECOND FLOOR PLAN.

A DOUBLE DWELLING FOR THE ALLEGHENY COUNTY WORKHOUSE AT CLAREMONT, PA.—See page 77.

MR. J. K. A. BILES, ARCHITECT.

Torazzo, Cremona.
Campanile, Torcello.
Tower of S. Gimignano.

Dome of S. Gaudenzio, Novara.
Scala Minella, Venice.
Torre dell' Orologio, Vicenza.

Tower, Palace of the Podesta, S. Gimignano.
Leaning Towers of Bologna.
Tower of the Palazzo Vecchio, Florence.

SOME ITALIAN TOWERS.—See page 77.

BOSTON PUBLIC LIBRARY

THE GREAT ARCH FOR THE CATHEDRAL OF ST. JOHN THE DIVINE.

Progress on New York City's great Cathedral of St. John the Divine is being made slowly. This is accounted for both by the slowness with which funds are received and by the difficulty of obtaining good foundations. The Cathedral is in the centre of Cathedral Heights, and occupies the most commanding position overlooking the Hudson River. When completed it will be 520 x 296 feet, and its spire will be 450 feet above the pavement, and nearly 500 feet from the lowest foundation. The walls and towers are being built of granite masonry laid on concrete footings, which rest on rock in large pits. While the Cathedral does not look as though it were hardly begun, in reality the crypt is completed and services have been held in it for some time. The crypt is really as large as many churches.

The tower will rest on four granite arches. At each corner there is a pier 38 feet square at the base, which will carry the arches which will spring to the total height of 143 feet above grade, or 155 feet above the footings of the pier. Two of these piers have been built to a height of 52 feet, and the others to a height of 70 feet, and a complete arch has been constructed. The four great arches will be duplicates, and each of them will be reinforced by a flying buttress. Buttresses will be built on the top of the piers, which will be 44 feet high. The springing line at each of the great arches will be 16 feet above the tops of the 70-foot pier, and its span will be 114 feet from tip to tip of the voussoirs and 86 feet clear. The rise will be 55 feet. The voussoirs are granite and are cut to template, and weigh from three to six tons. each. The construction gives a height of great massiveness, but the arches will not be visible after the completion of the church. There will be inner arches of soft stone and a ceiling dome below them, which will be supported by small piers adjacent to each of the main piers. These smaller piers will be connected to the larger ones by stone arches and steel tie-rods. The voussoirs of the great arch were laid in mortar made with Portland cement. When the arch was finished the keystone was found to be only half an inch out of position laterally and three-quarters of an inch vertically. The arch was, of course, built on centres.

ONE OF THE GREAT TOWER ARCHES OF THE CATHEDRAL OF ST. JOHN THE DIVINE, NEW YORK CITY.

A MODERN DWELLING AT SPRINGFIELD, MASS.

The engravings shown on page 71, in this issue, illustrate a modern dwelling, which has been erected for the Forest Park Heights Land Company, at Springfield, Mass. The elevations presented show a design of attractive appearance, with many excellent features, including a spacious piazza, bay windows, balconies, etc. The underpinning is built of brick, laid up in red mortar. The superstructure above is covered with sheathing, paper, and then clapboards and shingles. The clapboards are painted a brownish gray color, while the trimmings are painted white. The shingle work is stained a walnut brown color. The roof is also shingled and stained. Dimensions: Front, 40 ft. 5 in.; side, 29 ft. 4 in., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The interior arrangement is most complete, and is finished off in a most unique manner. The main hall is trimmed with ash treated natural, and it contains an ornamental staircase turned out of similar wood, and also a paneled wainscoting. The floor is laid of oak. The parlor and dining-room are trimmed with whitewood and finished natural. The library is trimmed with ash and finished natural. It contains an open fireplace trimmed with a tiled hearth and facings, and mantel of excellent design. The kitchen and its apartments, and butler's pantry are trimmed and wainscoted with whitewood, oiled, and furnished with the best modern conveniences. The second floor is trimmed with white wood and ash. It contains four bedrooms and bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains two bedrooms and ample storage. A cemented cellar contains furnace, laundry, and other necessary apartments. Messrs. Louis Frank Neuman and Carrol H. Pratt, architects, 21 Elm Street, Springfield, Mass.

Our engravings were made direct from a photograph of the building, taken specially for the Scientific American.

A RESIDENCE AT OGONTZ PARK, OGONTZ, PA.

The engravings shown on pages 61, 68, and 69, in this issue, illustrate a residence which has recently been completed for Wm. T. B. Roberts, Esq., at Ogontz Park, Ogontz, Pa. The building is treated in the Italian Renaissance style of architecture, and it has many excellent features, including an entrance porch with columns, porte-cochère at side, piazza at rear, and balconies at second floor. The terrace at corner of house, with fountain, is also an attractive feature. The underpinning and first story up to window sills, and also quoins, are constructed of Roman buff brick, while the walls external are built of common brick and coated with rough plaster and cement stucco, which is quite in harmony with the roof, which is covered with a brilliant red Spanish tile. Dimensions: Front, 113 ft.; side, 44 ft. 4 in., not including piazza and porch. Height of ceilings: Cellar, 8 ft.; first story, 11 ft; second, 10 ft.; third, 9 ft. The interior has received much study and attention in the arrangement of the various apartments. The interior of each room has been designed with special care, and the whole general effect, with its numerous archways and columns, is most attractive. The good vista of the whole is obtained immediately upon entering. The ceiling of porch at entrance and porte-cochère are beamed. The vestibule has a floor laid in mosaic tile, and walls and ceiling paneled in oak. At the right of entrance a lavatory is provided, over which the stairs rise up to second floor. This staircase is a very handsome one, is broad and spacious, and is provided with newel columns rising up and supporting circular arches from which they spring. This stairway is lighted effectively with a leaded glass window glazed with delicate tinted glass, which sheds a soft and pleasant light over upper and lower halls. This staircase is turned out of white quartered oak. The hall, which is a central one, is trimmed with white quartered oak. It has an oaken floor, paneled wainscoting, and a beamed and ribbed ceiling. The numerous columns and circular archways present an arcaded effect. The fireplace is built of Roman brick, and it has a hearth and facings laid with mosaic tiles in an artistic manner, and the whole is finished with a mantel shelf handsomely carved. The parlor at the left of entrance is trimmed with white pine, and is treated with white china gloss. It is provided with a Roman brick fireplace, with facings and hearth of mosaic tiles, and a mantel shelf with mirror. The music-room is treated in a similar manner. The library is trimmed with cherry. It is treated in the Dutch style. It has a paneled wainscoting, ceiling beams, bookcases built in, desk built in, and a large open fireplace built of Roman brick, with tiled facings and hearth, and a wood shelf, with a massive carved hood over same. The bay windows at front have paneled seats. The dining-room is trimmed with white quartered oak, and it has paneled wainscoting, ceiling beams, paneled seats in bay window, and an open fireplace trimmed with tiles, and mantel. The butler's pantry is trimmed with chestnut, and is provided with dresser, cupboards, and bowl complete. The kitchen, laundry, and its apartments are trimmed with white quartered oak, and are fitted up with all the best modern conveniences. The second floor contains a large open hall, three bedrooms, three dressing-rooms, sewing-room, three bathrooms, seven closets, linen closet, and storeroom. The bedrooms are trimmed with oak and cherry respectively. A most attractive feature is the dressing-room attached to each bedroom, and separated from same by cluster of arches supported on columns.

These dressing-rooms are furnished with stationary bowls, etc. The bathrooms are trimmed with white pine, treated in white china gloss. The floors are paved, and the walls are wainscoted with tiles. These rooms are furnished with porcelain tubs and fixtures, with exposed nickelplated plumbing. The servants have a private stairway, which leads from kitchen and rises up to third floor, where their quarters are located. A cemented cellar contains the heating apparatus and other neces. sary apartments. Messrs. Keen & Mead, architects, 1420 Chestnut Street, Philadelphia, Pa. The contractors were as follows: Carpentry, Benton S. Russell, of Ambler, Pa.; plumbing, Britton & Shaw; plumbing fixtures, Haines, Jones & Cadbury Co.; heating, Makin-Kelcey Heating and Ventilating Company; tile and fireplaces, Adolph Grant & Co.; mantels and cabinet work, Francis D. Kramee; Roman brick, Jarden Brick Company; tile roofing, John Byrd, all of Philadelphia, Pa.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A SUMMER RESIDENCE AT ALLENHURST, N. J.

THE illustrations shown on page 65, in this issue, present the summer residence of J. J. Phelan, Esq., of New York, which he has recently had erected for him at Allenhurst, N. J. The house is of large dimensions, and the elevations are well broken by numerous bay windows, a spacious piazza, and porte-cochère and tower. The underpinning is built of red brick, laid in red mortar. The exterior framework is sheathed, papered, and then clapboarded on the first story, and shingled on the second and third stories. The clapboards are painted bottle green, while the shingles are left to weather finish a natural silvery gray. The roof is covered with shingles and finished similar. Dimensions: Front, 52 ft.; side, 54 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior arrangement is most complete. The main hall is trimmed with oak. It contains a very handsome staircase turned out of oak, with turned newel posts, balusters, and rail, and it is built with many broad landings, paneled seats, etc. At the rear of hall there is a bay window with seat, and at the side an open fireplace, with tiled hearth and facings, and an elegant mantel furnished by Bradley & Currier. The parlor and library are treated in ivory white, and are separated from hall and from each other by archways provided with ornamental Ionic columns. Both have fireplaces, with tiled facings and hearths, and mantels of handsome design, made by Bradley & Currier. The library has a paneled seat built in. The dining-room is trimmed with cypress, and is of large dimensions, and it has a circular projection thrown out at one side, and it contains an open fireplace. The butler's pantry, kitchen, and rear hall are trimmed with cypress, and are fitted up complete. The kitchen has an open fireplace furnished with a Richardson & Boynton range. The rear porch contains an ice closet. The second and third floors are trimmed with cypress. The second floor contains a large open hall, six bedrooms, eight closets, and one bathroom furnished with imitation tiled walls, and a Standard porcelain lined tub, and J. L. Mott's fixtures, with exposed nickelplated plumbing. The third floor contains a billiard-room, two guest chambers, and servant's room, with private staircase, besides ample storage. A cemented cellar contains laundry, Richardson & Boynton furnace, and all other necessary fixtures and apartments. This house was designed and built by the Coast Land Improvement Company, of Allenhurst, N. J.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT SPRINGFIELD, MASS.

WE present as the subject for illustration, on page 72, in this issue, a residence erected for Henry Marsh, Esq., at Springfield, Mass. The design presented is excellent in its treatment, and a happy combination of both the Colonial and classic style of architecture is secured. The underpinning is built of brick, laid up with red mortar. The superstructure is covered on the exterior frame with sheathing, paper and clapboards. It is painted a deep Colonial yellow, with light buff trimmings. The roof is covered with shingles, and left to weather finish natural. Dimensions: Front, 45 ft.; side, 42 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The hall is entered through a lobby with mosaic tiled floor and paneled walls and ceiling. On either side of lobby there is provided a lavatory and coat closet. Upon entering the building there is found a broad platform, from which rise three steps to level of main hall. This hall is trimmed with oak, and it has a paneled wainscoting, massive ceiling beams, and an open fireplace, with tiled facings and hearth, and a massive carved mantel. Paneled seats are provided on either side of fireplace. The staircase is a handsome one, rising up to a broad landing provided with seats and a cluster of windows. The newels and balusters are neatly turned. The parlor is treated in old ivory white in a delicate manner. The library is trimmed with cherry, and furnished with an open fireplace, with tiled hearth and facings, and mantel. The trimmings are of wrought iron. The dining-room is trimmed with oak, and it has a paneled wainscoting and ceiling beams. It contains a bay window, thrown out, with flower shelf. China closets, with leaded glass doors, are provided in either corner of dining-room. The kitchen and its apartments are trimmed and wainscoted with hard pine and finished natural. These apartments are fitted up in the best possible manner. The second floor contains four large bedrooms, treated in white enamel, and a bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains one bedroom, billiard-room complete, and ample storage. A cemented cellar contains laundry, furnace and other necessary apartments. Cost, complete, $9,000, including steam heat, which cost $650. Mr. G. Wood Taylor, architect, Springfield, Mass. The contractors were as follows: A. B. Root, builder; J. U. Kennely, plumber; George R. Estabrook, heating, by the Richmond boiler, steam system.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A SUMMER COTTAGE AT DEAL BEACH, N. J.

WE present herewith, on page 67, in this issue, a summer cottage, which has been erected recently for the Atlantic Coast Realty Company, at Deal Beach, N. J. The engraving presents a design both novel and unique. The house, designed for summer uses only, is built without any kitchen or scullery department, the latter being centred in one great club, the Deal Country Club, which is within easy access. This cottage is one of several others of the Deal Beach group, which we have illustrated in our previous issues of the BUILDING EDITION. It is treated in the gambrel roof style, and has many attractive features. There being no cellar under the house, the building rests upon posts with stone footings, and the exterior framework of the building is covered with sheathing, paper, and then shingles; the whole stained a mahogany color, while the trimmings are painted ivory white. A feature of the cottage is its broad piazza, well shaded, and its living-room, which contains a bay window with seat, an ornamental staircase with newel, posts, balusters, and rail, and its fireplace, which is built of Roman brick, with hearth and facings of same, and finished with a neat wood mantel. This floor also contains two bedrooms. The second floor contains three bedrooms and bathroom, the latter furnished with a "Standard" porcelain-lined tub and J. L. Mott's fixtures, with exposed nickelplated plumbing. The trim throughout is simple whitewood mitred, and then painted white. The walls are treated with watercolors in delicate tints. Mr. William G. Massarene, architect, St. James Building, New York.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN STABLE AND CARRIAGE HOUSE AT SPRINGFIELD, MASS.

WE present on page 73, in this issue, a modern stable, which has been erected for Henry Marsh, Esq., at Springfield, Mass. The design presented is exceptionally good for a carriage house and stable, and is treated in harmony with the residence to which it belongs, and which we also illustrate on page 72 in this issue. The underpinning is built of brick, with stone footings. The superstructure, of wood, is covered with sheathing, and then clapboarded and painted a dull Colonial yellow, with light buff trimmings. The roof is covered with shingles and is finished natural. The building is 28 feet deep and 48 feet wide. The interior is ceiled up with narrow beaded yellow pine, finished natural with hard oil. The building contains a large carriage-room, with all the proper fixtures and conveniences, and a stable provided with one single stall and two box stalls, harness closets, etc. Stairs lead to hayloft and to man's room on second floor. Cost of stable, $2,500, complete. Mr. G. Wood Taylor, architect, Springfield, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A DUTCH COLONIAL RESIDENCE AT MELROSE, MASS.

THE engravings illustrated on page 66, in this issue, present a residence recently completed for Mr. Fowkes, at Melrose, Mass. The building is treated in the Dutch Colonial style of architecture, and it has many excellent features, artistic detail, and a most excellent interior arrangement. The numerous bay windows, latticed windows, etc., are attractive features. The terraces, front steps, balustrade, and piazza underpinning are built of rock-faced field stone, laid up at random. The superstructure is built of wood, and the exterior framework is covered with sheathing, paper, and then shingles, stained a dark brown, soft in tone, while the trimmings are painted a cream white. The roof is shingled and finished natural. Dimensions: Front, 42 ft.; side, 50 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The entrance is through vestibule into a large central hall, from the centre of which rises an ornamental staircase, with newel posts rising to ceiling, and forming an arched effect. This hall is finished in best quartered oak, and the walls are paneled in oak to the height of seven feet, above which the walls are covered with tapestry. The library and dining-room are trimmed and treated similar, and the latter has a massive beamed ceiling. Both have open fireplaces furnished with tiled facings and hearths, and handsome hardwood mantel. The dining-room also has china closets, built in an unique manner, on either side of fireplace, with leaded glass doors. The drawing-room, of large dimensions, is trimmed with oak and treated with white enamel. This room is divided in three parts by pilasters and beams. The large open fireplace has facings and hearths of Mexican onyx, and a mantel made from special design by the Boston Tile and Mantel Company. The kitchen and its apartments are fitted up in a most complete manner, including a Magee range. The rear hall and stairway, the large, well-fitted-up pantry, the entry large enough to admit ice box, are all good features. The second floor is treated in colors, and it contains a large open hall, five large bedrooms, with closets and fireplaces, and bath-room with tiled wainscoting and paved floor, put up by the Boston Tile and Mantel Company, and furnished with Peck Brothers' porcelain fixtures and exposed nickelplated plumbing. The third floor contains servant quarters and ample storage room. A cemented cellar contains laundry, furnace, and other necessary apartments. The house is heated by the Walworth Heating Company, indirect system of hot water, of Boston, Mass. The contractors were as follows: Carpentry, George C. Ogden; mason work, George Wentzel; plumbing, R. H. Curry; painter, C. H. Cummings; all of Meline, Mass. Mr. Lewis A. Door, architect, Melrose, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A DOUBLE DWELLING FOR THE ALLEGHENY COUNTY WORKHOUSE, AT CLAREMONT, PA.

WE present herewith, on page 74, in this issue, a modern double dwelling-house recently erected for the Allegheny County Workhouse, at Claremont, Pa. The design presents an excellent example for a double dwelling, and it combines both good elevations and well-arranged plans. The underpinning is built of rock-faced blue sandstone. The superstructure is built of red brick, laid up in white mortar. The trimmings are of rock-faced blue sandstone. The gables are covered with ornamental stained shingles. The roofs are cover with "Bangor" slate. The outside woodwork is painted white, with dark olive green sashes. Dimensions: Front, 42 ft.; side, 49 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.: third, 8 ft. The vestibules have paneled walls and tiled floors. The front doors are glazed with polished plate-glass. The window transoms in parlors and side sash in hall are glazed with leaded cathedral glass. The interior throughout is trimmed with white pine and grained. The halls contain ornamental staircases, with turned newel posts, balusters, and rail. The parlor and dining-rooms are separated by double sliding doors, and are provided with open fireplaces trimmed with tiled facings and hearths, and Colonial mantels. The kitchens are wainscoted, and are fitted up in the best possible manner with all the modern conveniences. The second floor of each house contains three large bedrooms, with well-fitted-up closets, alcove, linen closet, and bathroom, the latter wainscoted and furnished with enameled tub, the usual fixtures, and exposed nickelplated plumbing, furnished by the "Standard" Manufacturing Company, of Pittsburg, Pa. The fireplaces on this floor have slate mantels and tiled hearths. The third floor of each house is treated in colors, and it contains several bedrooms and ample storage. A cemented cellar contains laundry, furnace, and other necessary apartments. The house is piped for natural gas, and is provided with "Rand" instantaneous hot-water heaters. Cost, $8,350, complete. Mr. J. K. A. Biles, architect, Sharpsburg, Pa. The building was constructed by labor mostly furnished by the institution, but the plastering was done by R. H. Haley, Hoboken, Pa., and the slating by R. W. Taylor, of Sharpsburg, Pa.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

SOME ITALIAN TOWERS.

A MOST interesting and important volume might be written upon the towers of Italy, both the campanili of the churches and the towers connected with the civic buildings. There is scarcely a feature of Italian architecture which is so marked as the tower. The function of the tower in the old days was quite different from to-day. First it was to provide a place of safety for the protection of the treasures of the church or state during frequent tumults within the city or against the attacks of pirates. It was also necessary for the hanging of bells

which were used either to summon the faithful to worship or to call the townsmen to arms. In Italy the campanili, or bell towers, were usually separated from the churches, although not in all cases, and where towers were provided for civic buildings they were usually built directly to the structure and formed an important part of it. Several illustrations are shown on page 75.

The earlier towers were nearly always of square plan, and were either perpendicular or slightly battered from base to summit. They usually had low pitched roofs, sometimes machicolated. The termination of the towers varied according to local conditions; sometimes it was necessary, for purposes of defense, for the tower to provide facilities for a number of fighting men, and in other cases the tower was largely for decorative purposes. Nearly all of the hill towns of the Apennines, and even the cities of the northern plain, had their towers fringed with Ghibelline and Guelph forked parapets and battlements, so that these crenellated towers really form a class by themselves. They are particularly to be found in San Gimignano, Siena, Florence, Pisa, Pistoia, etc. Many of the towers have another small tower upon the top, as in San Gimignano, as shown in our engravings. At the lower left-hand corner will be seen the stately tower of Palazzo Vecchio of Florence, dating from 1300. This view was taken through one of the windows of the beautiful campanile of the Cathedral of Florence. The old castle of the Signory covers an area of 140 x 200 feet. The tower measures 26 feet on the base and is 18 feet deep. It is a marvel of bold construction, its front wall being a continuation of the projecting fourth-story wall of the façade and its head being crowned with machicolations. The wall above terminates in forked battlements, within which rises an open belfry with single round arches and massive round piers. There are forked battlements above again and a pyramidal roof. The tower is 280 feet high exclusive of the roof, and the winding staircase around one of the columns permits the venturesome visitor to reach the top of the smaller belfry. This is, perhaps, the most famous of the towers in our page of engravings, but one of the most beautiful and interesting is the campanile of the Cathedral of Torcello. The church was built about 641, and was restored again in 864 and in 1008. While the Italian tower is nearly always simple in mass and direct in expression, it is seldom richly ornamented, and this is the case with the campanile at Torcello, where nothing could be simpler or more effective than the elegant proportions of the structure.

The two towers of Bologna, the taller of which is 320 feet high, are of great interest, in view of the fact that they both lean, and lean toward each other. The taller tower, Torre Asinelli, is 4 feet out of perpendicular; it was built in 1109. A rough staircase of 447 steps leads to the summit, which commands a fine view. Single visitors are not allowed to ascend, but a companion may be hired for ten cents. The smaller, Torre Garisenda, was built in 1110, and is 163 feet high, and is only 10 inches out of perpendicular.

The dome of San Gaudenzio, at Novara, is another curious affair. It was built by Antonelli in 1875–1878, and is 396 feet high. The same architect built the remarkable Mole Antonelliana, at Turin, which is 538 feet high, and has a dome which is striking, from its bold disregard of the ordinary technical rules of construction. The hall beneath the dome is 84 feet square, and is more than 300 feet high.

San Gimignano is the city of towers, and it gives some idea of how a town must have looked in the old days, when every man's hand was out against his neighbor. The Palazzo Pubblico is built of brick, and is about 70 feet high. At the angle of the front is a fine square brick tower, called the Torre del Commune. It is somewhat earlier than the palace, and is 30 feet square by 160 feet high. It has an open archway at the foot, through which a street is carried. It is finished with an arched corbel table and square battlements.

The Torazzo of Cremona was begun in 1283, to celebrate a peace between Cremona, Brescia, Milan, and Piacenza; it is 369 feet high. Its design is much like that of the other brick campanili in this district—a succession of stages of nearly equal height divided by arcaded string courses, and marked with perpendicular lines by small pilasters, and is almost without windows until near the summit. It is celebrated in the distich by

"Unus Petrus est in Roma,
Una Turris in Cremona,"

referring to the fact that there is only one tower in Cremona. Another saying is, "One Peter is in Rome, one tower in Cremona, one arch in Ancona." This building has an interesting story. The Emperor Sigismund and Pope John XXIII. went together in seeming amity to Cremona. There an incident nearly took place which, by preventing the Council of Constance, might have changed the fortunes of the world. Gabrino Fondoli, the Podestà, had become Tyrant of Cremona. He entertained his distinguished guests with sumptuous hospitality. He led them to the top of the tower to survey the rich and spacious plains of Lombardy. On his deathbed Fondoli confessed the sin of which he deeply repented—that he resisted the temptation to hurl the Pope and the Emperor down, and so secure himself an immortal name.

The tower at Vicenza, known as Torre dell'Orologio, is 265 feet in height, and is a fine specimen of Italian tower, standing next to the Basilica Palladiana.

The last tower which we have to describe is really more of a staircase than a tower; it is the Scala Minella, at Venice, and is a curious spiral staircase of the fifteenth century. It is almost impossible to find this curious staircase without the aid of a gondolier.

Color and Texture in Buildings.

Color plays a large part in architecture, and we mean chiefly that wider definition of color that would include those many manifestations of tone, light, and shade which are produced by material, texture, scale of parts, breaking up of surface by details, elaborate relief ornament, and the like. If we take the true etymological meaning of "color" from the Latin to be an inherent property in light which gives to external objects different hues or shades when seen by the eye, we obtain exactly what we mean here by color—a hue, or shade, or complexion of a building produced by its surface, the smallness of the parts of which it is composed, its material, texture, or decoration, and in this sense such a building as Henry VII.'s chapel, Westminster Abbey, with its elaborate paneling and traceried surface, has a distinct hue when we compare it with, say, the plainer ashlar surfaces of the nave and western front—supposing, of course, the stonework is not blackened by smoke. St. Paul's Cathedral and Westminster Abbey has each its own complexion, owing to the character of the architecture; the horizontal features and flat surfaces of the one, and the elaborate vertical lines and shadows created by the buttresses of the other. The crust of blackness with which both these edifices are covered obscures the complexion or color due to detail, and itself imparts a hue which distinguishes them from the gleaming marble churches of Italy or Venice conceived in the same style. In London, and some of our great Northern cities, the architect has to reckon with this element of black soot—a coating which envelops all our buildings, and brings them all to one sombre tone after a few years. To some extent this coating of black obscures the complexion due to architectural detail, but not entirely. The closeness of features like columns, frequently recurring bays, buttresses, and panels of tracery, imparts a particular shade or depth of tone, owing to shadows; the more numerous the repetition, the greater the depth of shade. Again, the more projecting or salient the feature, the more the shadows are intensified. Thus we may distinguish the cathedral cut up by deep buttresses at frequent intervals and the Classical building of flat pilasters; the former would produce greater depth of shadow than the latter. These degrees of shadow caused by projections and detail are worthy of the architect's consideration, and ought to suggest to him the importance in narrow dark city streets of flat treatments of dressed stone ashlar or of brickwork. Colonnades, and columnar façades with recessed parts are not desirable in narrow streets, and their proper value can only be realized in wide thoroughfares, or in open spaces where plenty of light is obtainable. Designers of some of our city buildings lose sight of this; they cut up their fronts with pilasters or projecting features, and thereby lose the qualities of breadth and brilliance, so valuable in our towns. Look at the breadth and whiteness of many of of our plain ashlar-faced buildings, how their surfaces reflect the light—even some portions of the south side of St. Paul's reveal this brilliance of plain faces of Portland stone; also a few of the city steeples which gleam in the sunlight. What the natural texture of stone is as it leaves the mason, the plain wall or ashlar-faced building is; by dividing it into features by buttresses or columns, we break the surface up and reduce the reflecting light. Rustication, numerous window openings, pilasters, molded courses, etc., have a similar effect in reducing the light-reflecting surfaces of stonework, as may be seen in the façades of the New Bankruptcy Buildings and the Law Courts, the discoloration by smoke and weather being left out of account. Such breaking-up features may be described as texture or color produced by architectural means.

Color, in its more restricted sense of the natural tone of material, is a subject that the architect has very little taken account of in his designs. The stone is selected now for its suitability and its comparative cheapness, not so much for its color. The architect has a fair choice of granites, marbles, and freestones—chiefly the latter. These materials cannot be treated alike; the granites and marbles could not be carved into small or elaborate detail. They could only be treated in large smooth surfaces, and polished; the only kind of carving that could be executed in granite being in incised lines or channels, as we see in Egyptian architecture. Large surfaces of marble, highly polished, and displaying the beauty of color and veining, render this material of great decorative value in panels, the lining or facing of walls, so common in the Italian churches, being its most customary mode of employment, and very little attempt at carving, except in capitals and bases, and delicate surface enrichments, like friezes, being seen. In the employment of freestone, the architect has a much larger scope if he will select his stone with some regard for color and tone. There are white stones, the cream-colored and brown oolites of Portland, Wiltshire, Gloucestershire, Lincolnshire, Warwickshire; the brown and red sandstones like the red Corsehill of Dumfriesshire, and the bluish gray and greenish varieties of Monmouthshire, and the western districts like the Blue Pennant, each requiring its own treatment and working. Each locality is characterized by its own quarries. The red sandstones, for instance, confront us in many parts of England, as in Devonshire, Cheshire, and in Scotland. America possesses many fine red sandstone deposits in Pennsylvania, New York State, Canada, and other parts, and these have contributed largely to build the splendid brownstone mansions of the Fifth Avenue, where the *élite* of New York society, or the "Four Hundred," as the coterie of ladies is called, reside. It is said, indeed, that brownstone stands almost as much for the symbol of wealth as gold. Its color is a sort of dark "khaki"; it has a sombre effect in the street of palaces, but imparts a color to the thoroughfare. It is rough hammer-dressed; the quoins and large stones chisel-margined or beveled. These Fifth Avenue mansions have, therefore, a texture of their own, but they are monotonous. The aspect of the English modern-built mansion or palatial suburb, as one sees it in the West End, is wanting in color or texture. The stone, brick, and terra-cotta are turned out with a mechanical precision that destroys all color and texture. The very smoothness and exactness of shape of the pressed brick or tile takes away all the color and freshness of the old work, with its hard and diversified surface and uneven color. The modern builder and architect, if he builds a house, likes it faced and colored with a red or ochre wash, the joints and shakes stopped in, and the whole neatly finished "tuck-pointed"; if there is any timber framing in the gables or upper stories, all the beauty of color and the grain of the timber are disguised by paint; everything is smoothed over till all color and texture are lost. Eastbourne, Folkestone, and many of our modern South Coast watering-places are covered with houses of this colorless stamp.

There is another kind of quality known as "texture" that modifies the effect of buildings—namely, that produced by the surface of material, and the way it is worked or left by the tool. It is much more delicate and subtle in its effects than the texture due to architectural detail or ornamentation above described. The contrast between old and new buildings produced by modes of working the surfaces of stone, or granite, or brick and tile is often considerable. Weather-stains, the roughened surface of walls and roofs, and the modes of jointing come within this category.

Texture is a condition or quality of art that is overlooked. What do we mean by "texture"? It is a quality depending on the surface of the material, whether stone, wood, or plaster, and is a characteristic of all natural objects. Its effects on our vision have been given by a writer on the subject who observes that "varying inequalities of surface give a brilliancy and transparency to colors of all sorts not obtainable by any other means. Light and shadow are modified to a remarkable extent by texture, because there is not only the light and shade as shown by the general form of the object illumined, but also the light and shade of each little pore, cell, or other irregularity of which the texture is composed. These bring tiny specks of light and shade into the otherwise lifeless gloom or glaring light, as well as endless reflections which give brilliancy and transparency as well as depth and softness to the chiaroscuro and produce what is called luminosity of surface." The same author observes, further, how this valuable quality gives beauty and color to ancient walls and buildings due to the disintegration of surface by wind and weather, producing texture; and he instances the importance of this quality in metal, especially forged work, and says: "One reason why so much modern wrought-iron work looks feeble and mean compared with old work is not so much a question of design or even skilful handicraft as of texture." Instead of the forms of bar produced by hammer on anvil, the inequality of surface and texture, light and shade, produced by loving labor, we have now the rolling-mill, which reduces all sections of iron bar and rod to a smooth uniformity, and are bought ready-made to be bent or worked on.

Coming to texture as a quality of architecture, a great deal may be said. It is a condition of material surface, or that property of surfaces which affects our sense of sight, but is not anything definite in form or color. It is defined to be a quality of architectural surface independent of designed form or color. A writer, speaking of the subject, says: "Texture is a magical garment when well woven. It can throw over bricks and stone a veil which softens their outline, half-concealing and adding mystery to beauty, etc." As Nature has her own textures, so we may borrow her methods—the grain of wood, the rough, crystallized appearance of her stones or marbles, taking care that each has its proper natural texture. Our granite must not be treated or decorated

like metal, nor our stone like our wood; thus a stone cornice profile could be almost reversed to express a metal molding. By leaving our wood as it comes from the chisel and our stone as it comes from the saw, we may best express the surface or texture of the material or its natural fracture. The passion of our time seems to be for neatness and smoothness. The average man likes a neat piece of walling of tuck-pointed brickwork, or uniform coursed stonework; Welsh slated roofs of uniform courses and gauge, smooth-planed timbers of even size, cast iron of an exact repeat, wall-papers or plaster-work troweled to a perfect plane of smoothness and polish. All these are devoid of texture. Is not the uniform-colored brick wall tuck-pointed far inferior in artistic charm and variety to one built with well-burnt brick of diverse tints, as those left by the kiln, and of true shape but irregular texture, due to the same process, with simple trowel-pointed joints? Compare the two and see how the light is broken up, how the beauty of the burnt clay in all its diversified tints lends a charm to the latter; so the tiled roof of hard-baked tiles, with slightly vitrified surface, looks artistically superior to the die-square tiles of uniform color or the machine-made tile roof, with its trim courses and mechanical uniformity of make and color. The machine-made tile and brick lack character, there is no play of light and shadow caused by irregularity of surface and arris. On the contrary, the thickness of the mortar joints, the inequalities of roof covering, the coarseness of stonework, all throw a veil of texture over our old buildings.

We can expatiate largely on this "magical garment" of texture; how it can throw over bricks and stone a veil of color that adds a poetry to mere building; how our rustications, diapers, and patternwork, our enrichments, flutings, etc., though purposely designed, become texture when their forms are obliterated by distance, and how the larger features, like windows and piers, etc., merge by distance into a variegation of surface. The irregularity found in the noblest buildings has been pointed out by Ruskin. He has shown that in the Romanesque and Gothic work of Italy the builders had a contempt for the rule-and-measure plan for designing so common among us; he speaks of the irregular sizes of piers, wings of buildings, unsymmetrical traceries and patterns, curvature and deflection of walls from the right line, floors that are so uneven that they are like the waves of the sea, as that of St. Mark's at Venice. This want of exactness is seen in all ancient architecture. All this irregularity, diversity of hue and color, is the characteristic of the living human hand which gives pleasure to old works of masonry, wrought iron and woodwork, and stained glass, while the monotony of the machine-made and the smooth surface weary the eye.—The Building News.

The Weather Bureau on Lightning.

In view of the presence of the cyclonic period of the year when thunderstorms are of almost daily occurrence a report prepared by Professor Henry, of the United States Weather Bureau, on the subject, will be read with peculiar interest. It is unpleasant at the outset to note that the number of deaths from lightning stroke is increasing. For the year 1899 it was the largest on record. During the twelve months 562 persons were killed instantly, or received such injuries as speedily resulted in their death. In addition 820 received shock more or less severe, from which they ultimately recovered. Some of these recovery cases presented peculiar features. In several instances the clothing of the persons struck was set on fire and the bodies were badly burned, yet they ultimately experienced complete recovery. In some of the fatal cases there was no outward injury visible, while in others discoloration of the skin was observable all over the body. Some valuable hints are given in the report regarding the precautions that should be taken to avoid danger while a thunderstorm is in progress. Many housewives are partial to wire clotheslines, and insist in having them strung across their back yards. By so doing they not only subject the laundress to danger, but imperil any building to which the wires may be attached. Twelve persons were killed last year either in the act of stripping such lines or by coming in close proximity to the wires during the storm. Several fires were started through wire clotheslines being stretched between trees in the yard and the house. It is never wise to take shelter under a tree during a thunderstorm. About eleven per cent of all deaths that occurred last year were caused in that way. People in the house during a storm should keep away from the chimney and should not sit between open doors or by open windows. Riders should dismount from their horses and stand as far from them as possible during the storm. The greatest number of deaths from lightning in 1899 in any State of the Union was 56. These occurred in Pennsylvania. Illinois was second in the list of fatalities, 41 having been stricken here. Pennsylvania also was first in the number of injuries, 124 having happened in that State. New York was a close second in that respect, with a total of 103. Illinois had more people killed than injured. It also had the greatest increase in the number of fatal cases as compared with the previous year, though there was material increase in Pennsylvania, Ohio, North Carolina, Minnesota, and Michigan. The States in which the greatest decreases occurred were Texas, New York, and Alabama. No certain theory can be advanced to account for the increase or decrease of such cases. The lightning flieth where it listeth, and no man can tell where, when or why it is going to strike. It is questionable if the laws that govern its motion will ever be discovered. Investigation in this direction is considerably handicapped by the general reluctance to fool too much with the lightning buzz-saw.—Chicago Evening Post.

Testing Measuring Tapes.

In the instructions prepared for the use of surveyors engaged on the New York State canals about to be constructed, the following directions are given for testing tapes:

In determining the standard lengths of tapes to be used, a measurement should be made over a known distance, or else the tape tested by comparison with one of which the standard length is known. To do this for a tape 100 feet long, large stakes should be driven securely at each end of the 100 feet, with the top of each stake at the same elevation as determined by a Y level. Three intermediate stakes should be driven at 25-foot intervals, a nail driven in the top, and a loop of string or light wire attached, so that the end of the loop supporting the tape shall be in line with the centres of the end stakes, and at the same elevation. The top of each end stake should be covered with a piece of zinc. The distance between zero, or the 1-foot mark, and the 100-foot mark of the standard tape should be determined with a pull of 8 pounds, using a tested spring balance, and a clear-cut mark, made with a knife blade, on the zinc at each end of the tape, and the temperature as determined by a thermometer recorded. A measurement should then be made, under the same conditions, of the distance between zero and the 100 foot mark of the tape to be tested, another mark made, and the temperature recorded. The difference between the two lengths, as measured by a scale, should be recorded, and the proper correction applied, reducing both measurements to a standard temperature of 2 degrees Fahrenheit, and recording in a book kept for that purpose the number of the tape, the conditions under which it was tested, and with what standard, the authority, the tape error, and whether long or short.

Care should be taken to test the tapes only when no wind is blowing, and on a cloudy day. Generally the best time is at night. The standard tape and the tapes to be tested, with the thermometer, should be hung between trees, or otherwise supported, and left in the air from thirty to sixty minutes before the test is made, to assume the temperature of the surrounding atmosphere. Care should be taken, by stationing an assistant at each stake, that the tape is properly supported. No pressure must be allowed on the end stakes in the effort to hold the tape firm. Use a clamp, if necessary, to hold the fixed end, braced against a rod held in the ground back of the stake. A wide rubber band around the tape should be used in clamping the same to prevent slipping. Avoid a test in extreme temperatures. Several tests should be made, and each recorded, before adopting a final result. After the test has been made, the tape tested should be freed from the loops, and the number of pounds pull determined, which is necessary to give the same distance when supported between extremes as when supported at three points, and this pull applied when such a condition exists in actual measurements along the transit line.—The Architect and Contract Reporter.

Checking Dry-Rot in Floor Beams.

For our dry climate, remarks the American Architect, architects would undoubtedly advise supporting the beams with an iron girder at each end, and cutting off the rotten portion in the wall, removing at the same time the sheathing of the ceiling, which most American architects would advise leaving off entirely, in order to give free access of air to the beams. It is well known that a free circulation of air will check incipient dry-rot, and timbers which have mycelium threads through them will last many years if the growth of the fungus is checked; while new, fresh timber, set into the recesses in a stone wall from which rotten timber had been removed, would almost certainly be infected, without delay, by the spores or mycelium threads remaining in the stonework. It is said that mycelium threads have been known to run for some distance through the concrete of a cellar floor, to reach a piece of fresh timber, and the pores of a damp stone wall would afford them an excellent opportunity for shelter and development. Most architects, probably, have found that a new timber, set in the place of a rotten one removed, is almost always quickly infected; so that it would be unadvisable to put fresh beams in place of the old; and, if the middle portions of the old beams were still capable of carrying a load, our architects would probably, on general principles, arrange to have them do so until the necessity for further operations was demonstrated. As problems of this kind are of constant occurrence in architectural practice, it is a pity that some method cannot be devised for checking incipient dry-rot with sufficient certainty to enable architects to use it with confidence. Every one knows that creosoting, or Burnettizing, or Kyanizing, will, to a great extent, prevent the development of rot in wood; but all these processes, to be of any use, must be applied before the timber is utilized for building; and no method is known, or, at least, practised, for destroying the fungus in place. It is possible that formic aldehyde vapor might penetrate the wood deeply enough to accomplish a result, which a mere external application of creosote or corrosive sublimate is incapable of reaching, and some student of applied chemistry might do worse than investigate the subject.

The Theatre Francais Fire.

The fire which resulted in the almost total destruction of the Théâtre Français, Paris, is one of those reminders that there are some things that are not done better in France. We have often to complain of fires in our fireproof buildings, but although the inflammable nature of our American constructions is held up to the readers of foreign magazines as a dreadful warning, it would be almost impossible for any American city to be caught in the predicament which accompanied the fire in Paris. The conflagration started shortly after noon. Apparently the first thought of the management was the very laudable one of rescuing the imperiled artists, who were about to begin their rehearsal. Then the fire department was summoned with the usual promptness which characterizes affairs of that sort in Paris, but, as the dispatches naively remark: "Twenty minutes elapsed before the first detachment arrived, and then only hand pumps were brought. Finally steam pumps came, but then it was found that no water was to be had. It was 12.45 P.M., nearly three-quarters of an hour after the alarm was raised, before an adequate stream of water was poured into the burning building, which by that time was quite beyond help."

This is very amusing reading to Americans, who are accustomed to the almost instantaneous work of an ordinary, well-equipped fire department. Nevertheless, in a broader way, such an occurrence speaks volumes for the construction of the foreign buildings. We should hope that at no time would our fire department ever arrive at such a condition as was indicated in the dispatches, but it stands to reason that Frenchmen have never been blind to the possibilities of a conflagration, and if their firemen are so lax it is because they are so seldom called upon to cope with a fire of any magnitude. Our fireproofing methods are more scientific, and, on the whole, more generally applied, especially in down-town districts, than is the case in Paris. But we do not seem to have materially diminished the number of our fires thereby, either up or down town, and though we may smile at the performances of the French *pompiers* we may well envy the conditions from which such slackness arose.—The Brickbuilder.

Building Loan Associations.

The Secretary of the United States League of Local Building and Loan Associations has compiled the following statistics for 1899, which will be found interesting, as no data of this nature are collected through any other source from year to year. It should be remembered that the figures do not include "national" associations; only those that are local and truly co-operative:

States.	Associations.	Members.	Assets.
Pennsylvania	1,174	281,456	$12,120,436
Ohio	773	287,477	102,400,699
Illinois	599	100,000	54,104,602
New Jersey	335	90,100	46,100,000
New York	299	89,409	37,253,725
Indiana	424	109,043	31,435,587
Massachusetts	125	68,349	26,744,647
California	151	37,780	20,285,454
Missouri	191	38,000	13,835,817
Michigan	72	32,775	10,159,562
Iowa	79	23,000	5,723,799
Connecticut	15	12,773	3,774,526
Wisconsin	52	13,450	358,902
Kansas	46	12,000	2,880,764
Nebraska	60	13,813	3,332,781
Maine	32	8,115	2,975,716
Tennessee	26	4,795	2,874,097
Minnesota	46	7,500	2,848,179
New Hampshire	17	4,950	1,921,927
North Dakota	7	1,000	364,130
Other States	962	267,800	97,137,800
Totals	5,485	1,503,625	$581,857,170

The sale is announced of the old Bull Hotel at Rochester, which is a veritable Mecca for the lovers of the works of Charles Dickens from all parts of the world, says the British Architect. It will be remembered that it was at the Bull the Pickwickians put up on their arrival at Rochester, acting on the recommendation of Mr. Jingle; and the assembly room in which Mr. Tupman and Mr. Jingle danced with the widow, to the indignation of Dr. Slammer of the "99th," still retains the characteristics of Dickens's description. From the Bull it was that the expedition set off to Manor Farm, when the hostler remarked, concerning the sportsman Winkle, "Blow me, Bill, if the gent worn't a-getting up on the wrong side of the horse."

FRONTIER HEATER.

The question, "How to keep boilers clean?" is one that vexes all steam users. Scale accumulating in the boiler means a large increase both in the cost of fuel and of the bills for repairs.

Some steam users try to overcome this difficulty by using boiler compounds and purgers. This is an expensive and dangerous remedy; for, if the purger is strong enough to eat the scale, it will also attack the iron, and decidedly weaken the boiler.

After a wide experience with the heaters which they had placed in all parts of the country, the Ward Heater Company, of Detroit, Mich., finally adopted the open heater as the most perfect purifier, for the reason that to separate the lime, etc., held in solution certain gases must be driven from the water. This cannot be done when the water is under pressure, as is the case with closed heaters.

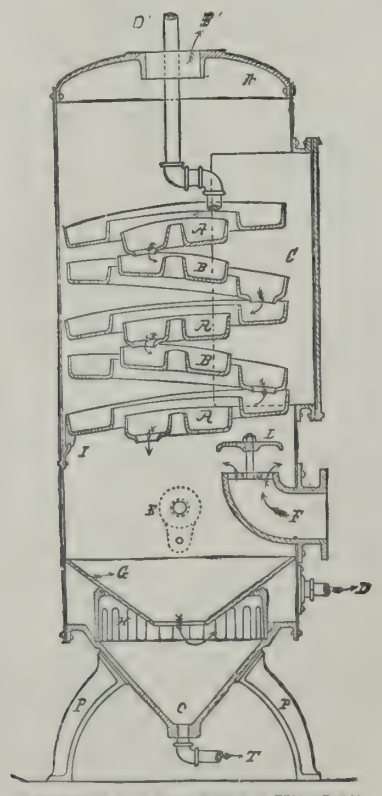
The company claim that the "Frontier Heater" overcomes all objections. It acts as a perfect water-catcher and the steam passes off comparatively dry. By this system of overflow, at intervals, the inlet of water to the heater and the waste are regulated automatically and no unreliable relief valve is required. By the same means all grease is completely removed from the water.

The shell or body of heater is made of 3-16-inch iron, of good quality. The top and bottom are made of cast iron. The pans, "A" and "B," are of cast iron, and are provided with dams to interrupt the course of the water, and expose all of the water to the pans, so that the lime and carbonates may deposit on their way downward.

The first downward course of the water directs all sand and neutral particles toward the bottom of the mud-pot, "O," and all that do not reach the bottom are caught between the mud-cells, as they retard the direct outward flow of water. "D" is the outlet to pump for boiler. The inclined sides of the mud-pot throw everything to the center, to be blown off as often as required.

The water entering the heater is led by a pipe into the pan "A," around which it passes through to "B," and on from pan to pan until it is led by a pipe to the bottom of the heater. In its course through the pans the water is heated by the steam which enters at "F" and passes off above, till it is thoroughly boiled, and the lime, etc., precipitated to the bottom and sides of the pans. By the construction of the pans the water is continually kept from the direct course of the moving steam, so that the latter cannot carry the water from the heater even though the heater be overloaded; on the contrary, all the wet steam is condensed by contact with the pans and unites with the feed water, and the exhaust passes off as dry steam.

A valve adjusts the supply of water according to the varying pressures in various locations. About every two minutes the water will overflow a little, carrying over the oil, magnesia, and all floating impurities. In the overflow will be noticed a slime known to



SECTION OF FRONTIER HEATER.

engineers as foam; when this is allowed to pass to the boiler, it deceives and kills many a good engineer by a disastrous explosion.

Only sufficient water is admitted to the heater to supply the pump at whatever speed it may run, and enough overflow to carry off the grease and scum. The automatic regulator is simple, has no parts to get out of order, never fails to act promptly, and relieves the engineer of all care usually required with an open heater. By this overflow at intervals the oil and scum are being continually drained off the top of the water. This heater is admirably adapted for use in breweries, laundries, and dye works, where clean salt water is required.

An Immense Door.

A steel rolling door, 35 feet 6 inches wide by 20 feet high, has just been constructed by the Kinnear Manufacturing Company, Columbus, Ohio, for a car-house at Worcester, Mass. This door is the largest by far ever constructed, and reflects great credit on the makers.

It is built on the well-known and excellent principles of the Kinnear steel rolling doors, and, despite its immense proportions, operates with the greatest ease.

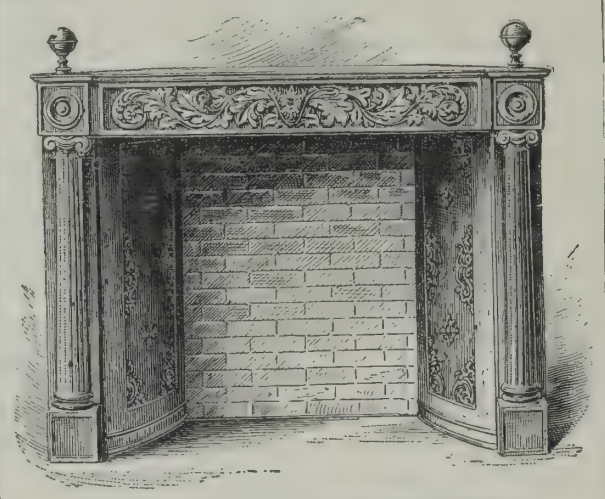
The makers report that they are supplying a great many doors for car-house purposes, as well as for all classes of railroad and public buildings; the automatic steel rolling doors, shutters, and partitions having found great favor among purchasers.

Durability, ease of operation, compactness, fireproof qualities, together with minimum cost of repairs, are among the most prominent features of the Kinnear doors—merits which are greatly appreciated by the company's many customers.

FRANKLIN STOVES.

In the Colonial days, the open fireplace was the sole means of heating. This was made very large, to accommodate four, and even six-foot logs, with a depth of some four feet. In the North, this deep chimney breast was made to project into the room, that the heat radiated from the stone or brick work might help warm the house.

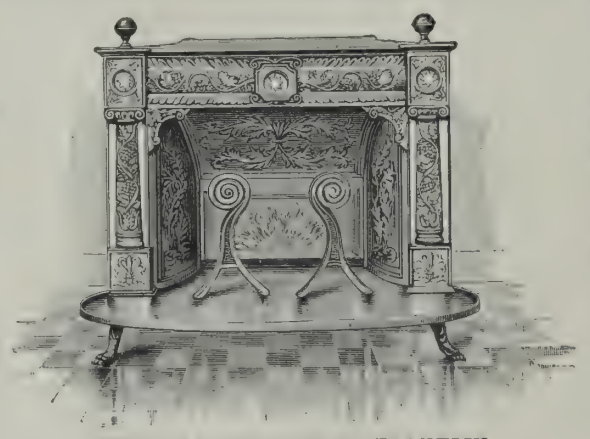
It was but a step to substitute iron jambs and top piece around the fire—because of the greater radiation—and this was the first Franklin stove.



FRANKLIN IN CALEB WEST'S ROADHOUSE.

The engraving shows one of these old Franklin stoves that originally (1768) stood in the roadhouse kept by Caleb West, on the Boston Road, near East Douglass, Mass.

Benjamin Franklin still further increased the heating power by adding a bottom and back to the original style. This becomes practically an open stove, standing on legs, and connected with the flue by means of a stovepipe.



STOVE AS IMPROVED BY FRANKLIN.

This latter style is valuable for use in rooms where there is no fireplace, and yet where the cheer and heat of the open grate are desired.

Another method of utilizing the heat from the open fireplace, and one that is even more effective, is that applied in the ventilating grate, in which a heat-saving chamber surrounds the entire fire, and enough warm air is secured to warm two large rooms in severest weather.

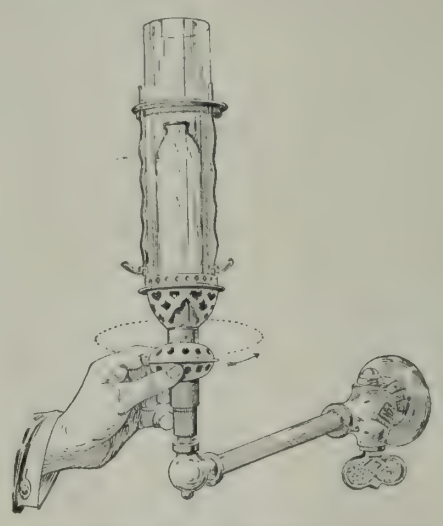
These ventilating grates, as well as the Franklins, are shown in Catalogue F, issued by Edwin A. Jackson & Bro., 50 Beekman Street, New York.

Mr. H. S. Northrop, of 41 Cherry Street, New York, has received the highest award at the Paris Exposition for his metal ceilings. The award bears additional testimony to the artistic and mechanical merits of his product.

No Steeple by Injunction.—There is a church in a Wisconsin town which has not had a steeple since 1862. In that year a violent wind took the steeple off the church. It crashed into a near-by house, and the owner of the house asked the courts to restrain the church people from building another spire. His application was granted, and the order has held for thirty-eight years.—N. Y. Evening Post.

THE CLIMAX INCANDESCENT BURNER.

With incandescent burners there has been much annoyance and trouble always to obtain the exact mixture of air and gas to secure the most effective combustion, with numerous failures in the attempt. Very many burners are in use which give but indifferent results from the amount of gas consumed; and with changes in the pressures from day to day, the burners vary in their illumination; likewise burners serving well at one place give poor service when removed and used elsewhere—



THE CLIMAX INCANDESCENT BURNER.

and burners used on one kind of gas cannot be used successfully on any other. All these objections the Climax incandescent burner, made by the C. M. Kemp Manufacturing Company, of Baltimore, Md., has met in the fullest manner. Its adjustment is instantly obtained to yield the greatest illumination.

It regulates the gas and air simply by revolving a controlling bulb. By turning the bulb in one direction an increased amount of gas and a decreased amount of air is fed to the burner; a reverse turn of the bulb decreases the feed of the gas and simultaneously increases the air opening, so that the illumination of greatest intensity is obtained immediately and with ease.

With its use any quality and kind of gas can be depended on to give as great brilliancy as the gas is capable of affording, and its regulation is quickly and very simply obtained.

The Bunsen feature of this burner applied to gas-stove burners improves them vastly, especially when used for a variable gas, such as gasoline vapor.

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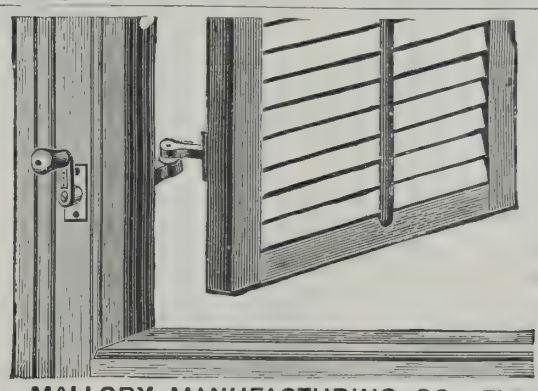

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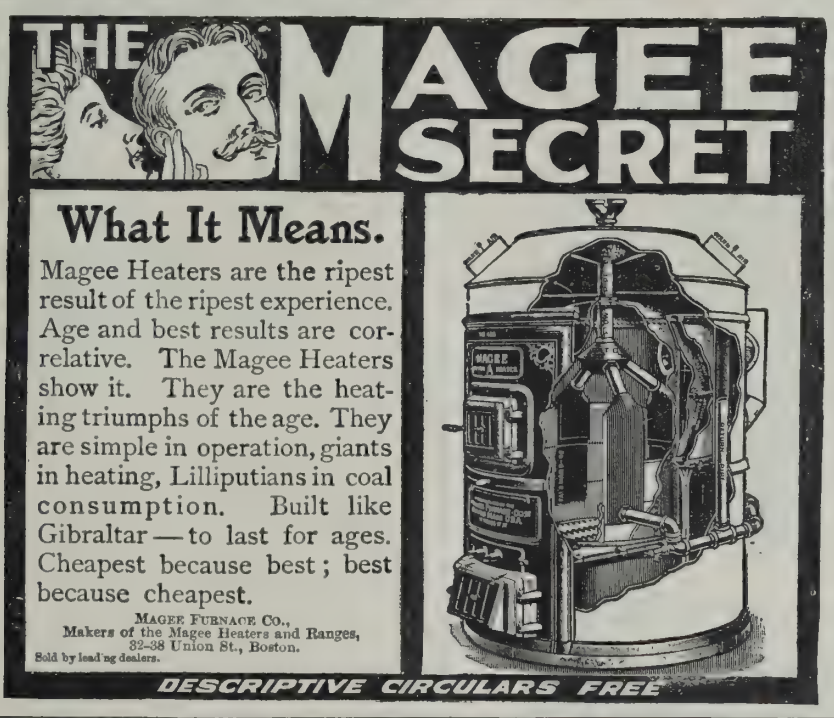

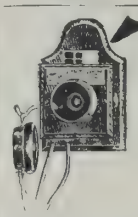

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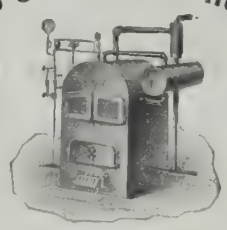

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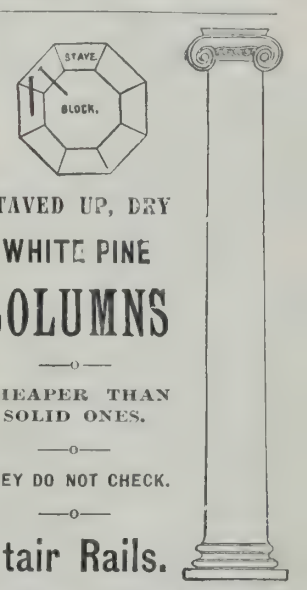

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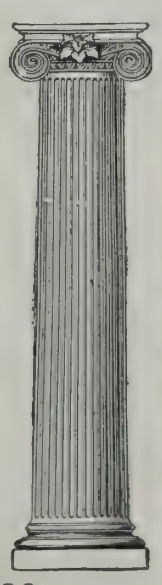

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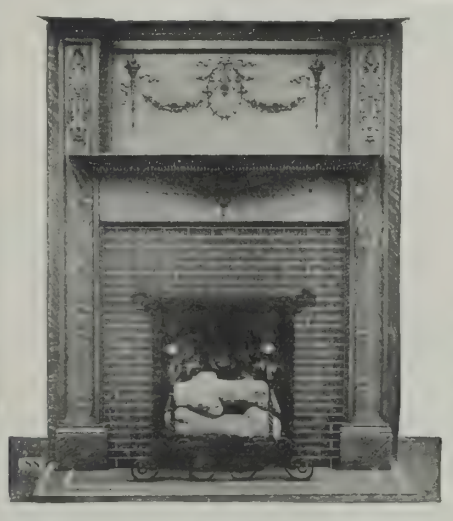

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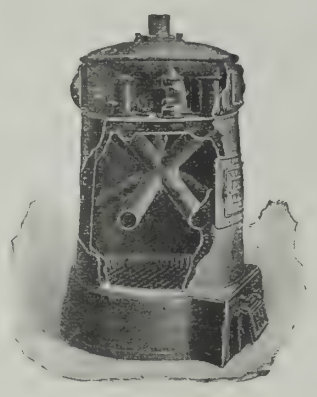

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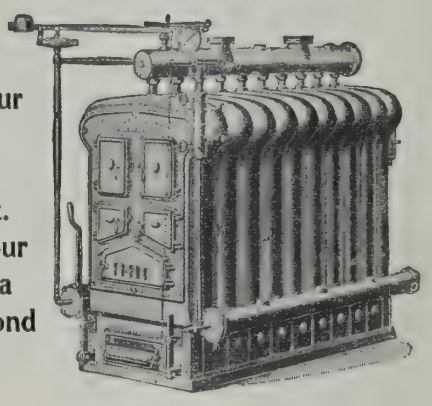

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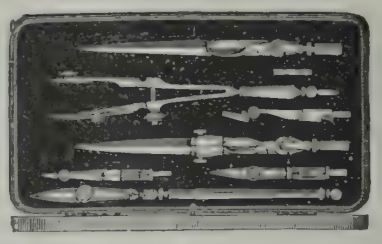

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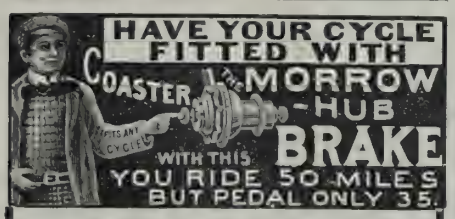

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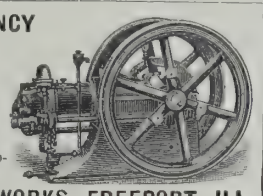

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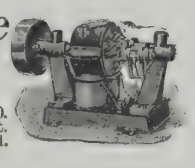

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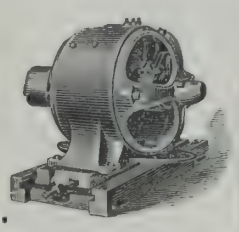

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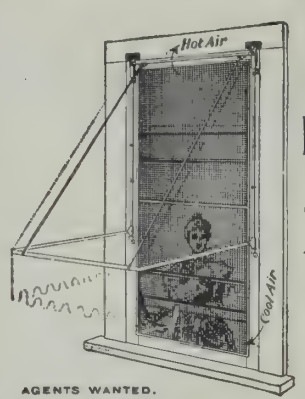

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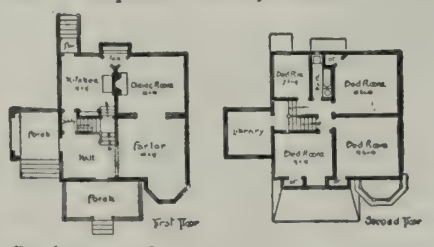

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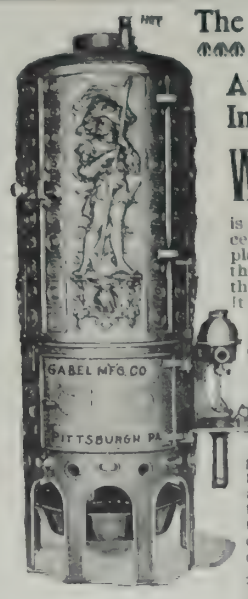

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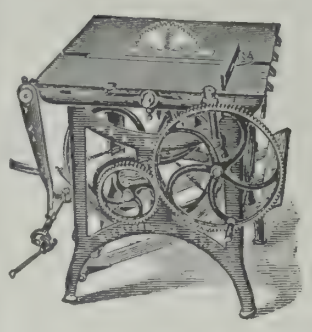

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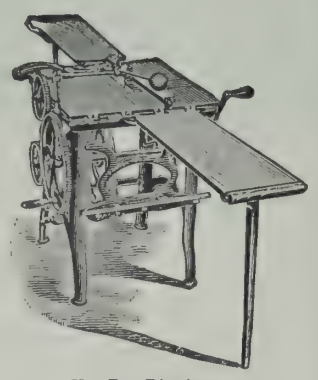

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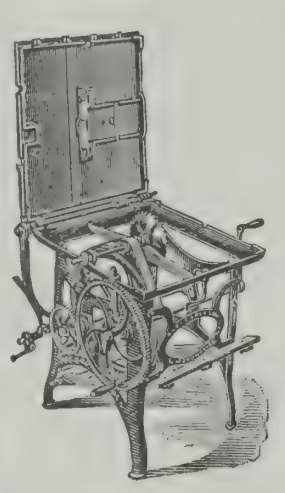

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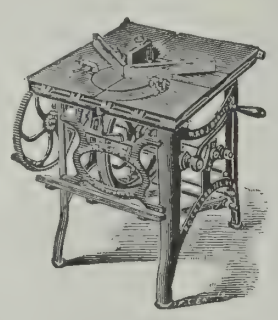

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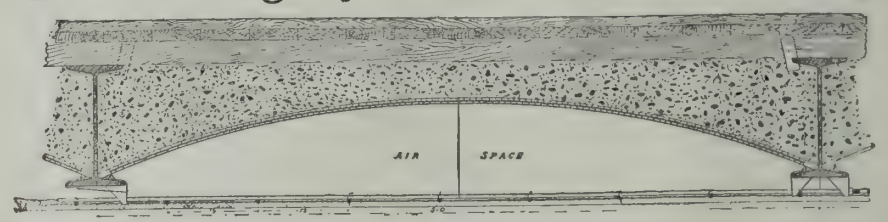

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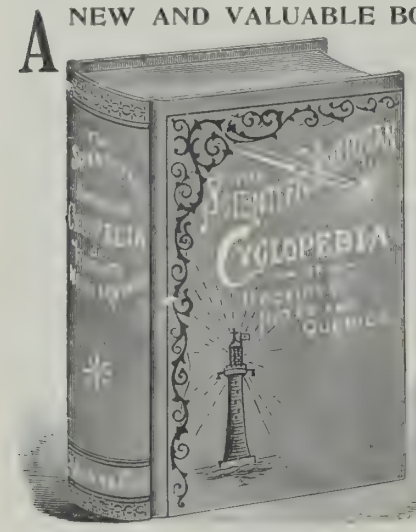

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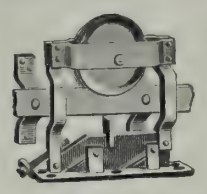

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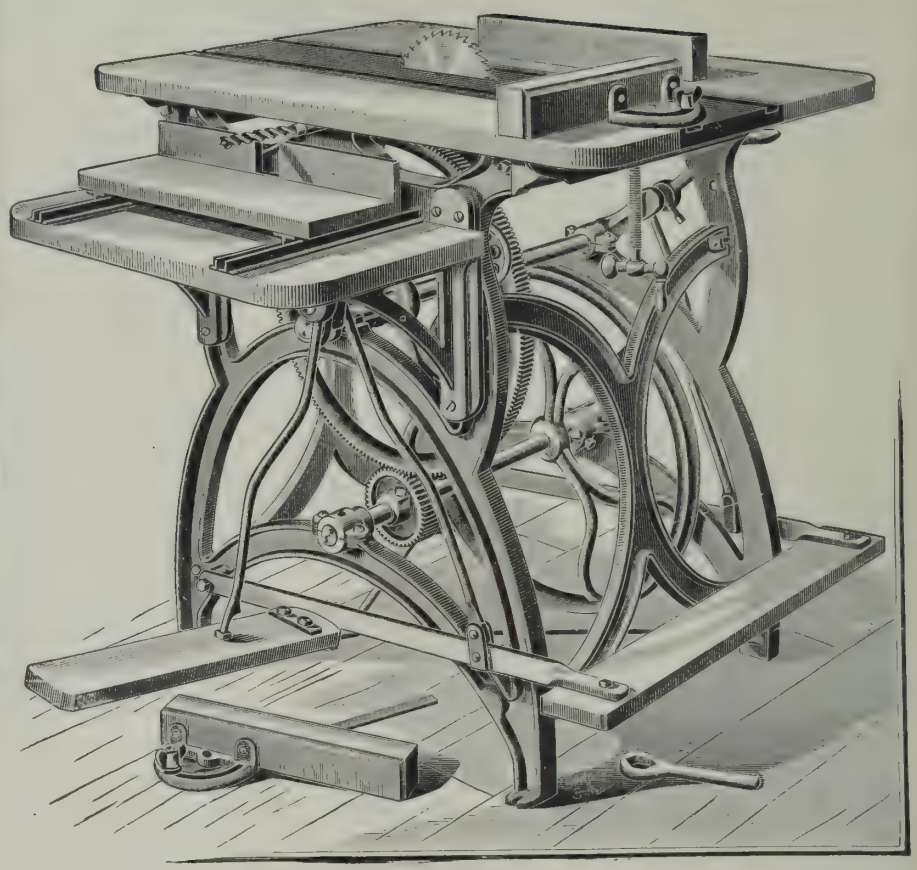

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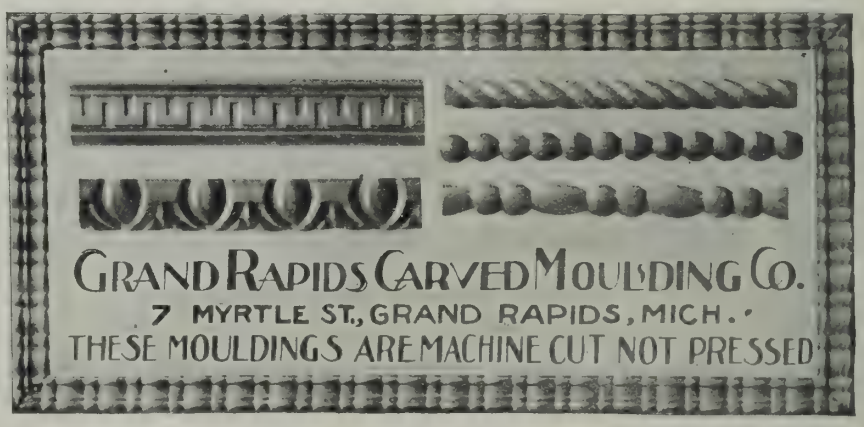

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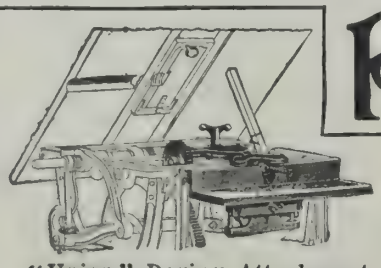

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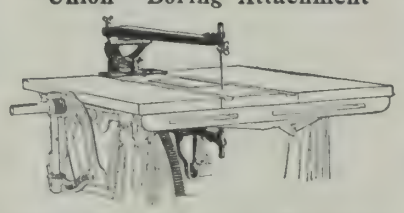

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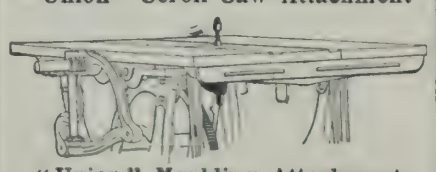

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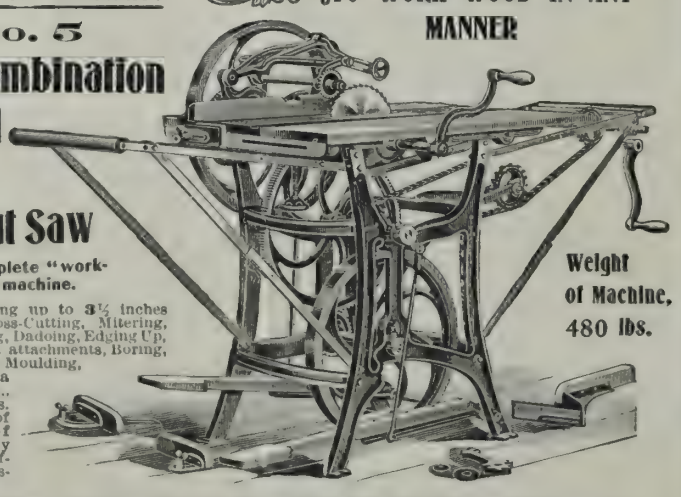

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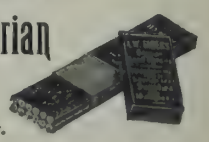

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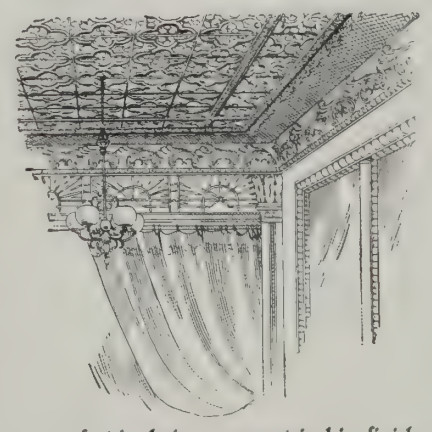

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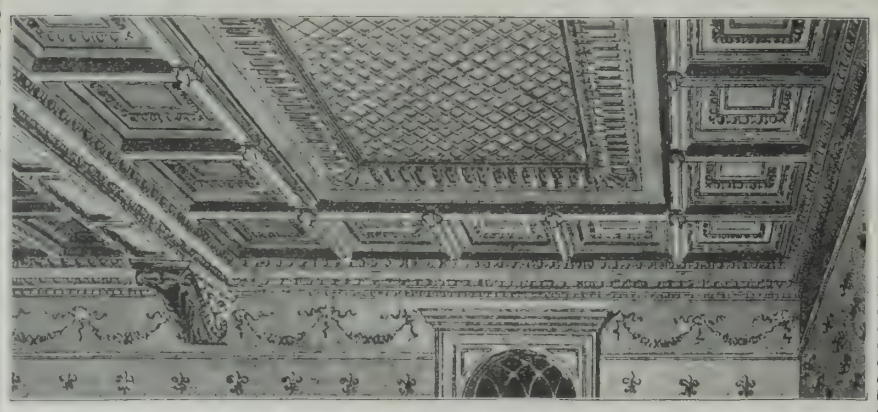

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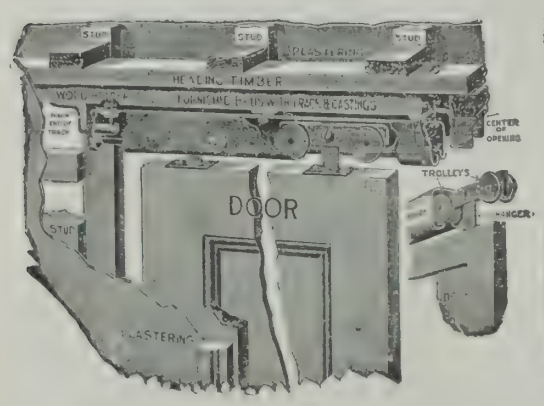

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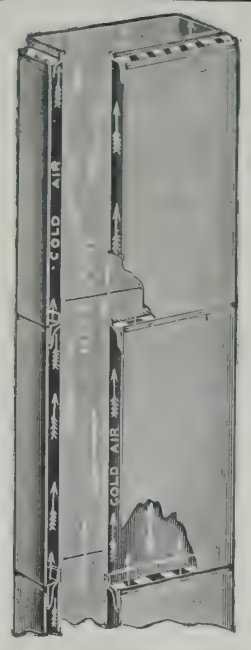

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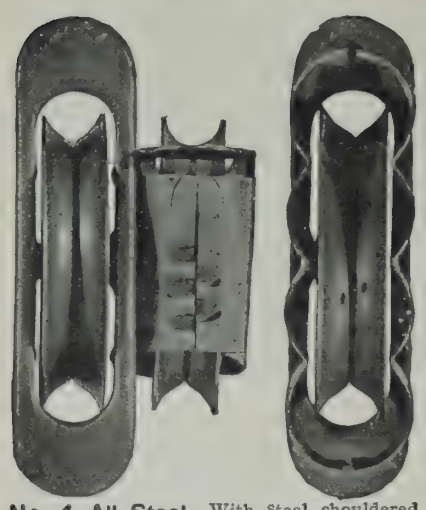

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MUNICIPAL IMPROVEMENT.*

BY LUCIA AMES MEAD, BOSTON, MASS.

THE three prerequisites to health, civic beauty, and normal civic life are space, pure air, and sunlight. With these insured, architectural beauty, street adornments of fountain, statues, trees, and flowers may easily follow. Without these prerequisites, provided by wise legislation and maintained by constant vigilance, all minor beauties of decoration are overshadowed or imperiled or destroyed. The four worst causes of modern city disfigurement are slum areas, crowded suburbs of cheap, wooden construction, abnormally high buildings and discordant settings for buildings, fountains, and statues.

The most congested tenement districts in the world are in New York city. Jacob Riis, an expert, declares, however, that the wooden rookeries of Chicago are worse than the tenements of New York, though population be less congested. Boston, San Francisco, and every large city in the country, however new, show a disgraceful section which should never be tolerated. The excessively high rents received for unhealthful tenement-house property make them tolerated where money, rather than men's lives, is the chief interest of the community. The examples of an aroused public sentiment in Glasgow, Birmingham, London, and in continental cities, which is beginning to wipe out foul areas and build model houses, needs speedy imitation in American cities. This subject deserves a lecture by itself and I shall not enter upon it. But the abnormally high buildings of steel construction, costing from one to three or four millions of dollars, is the greatest material obstacle to modern civic progress. It can not be wiped out like the rotten tenement block. It has come to cast its blighting shadow for a century upon its neighbors. So long as it stands alone, the dwellers in its upper stories have immense advantages of light and view, but as soon as every neighbor who is overshadowed builds to equal height the street becomes a noisy cañon, the lower stories become cellars, the sidewalks are congested with jostling crowds, and all business life becomes destructive of eyesight and nerves. Intercourse with one's fellows becomes a frantic scramble and game of push and grab.

The picture on the screen represents a view in Chicago taken from the Auditorium. To the average business man it perhaps seems a monument of enterprise and business success. To the man who cares for length of days more than for dividends, who values health and beauty and leisure for rational enjoyment, who remembers that he has only one life to live on this planet and can not afford to spend it all in merely getting ready to live here, such a spectacle seems a hideous commentary on the ideals of modern life. A friend once remonstrated with me on my protests against Chicago's high buildings. "If the people in Chicago want them," she said, "why should you trouble yourself?"

But the people in Chicago have never been asked whether they want them or not, any more than the people in Boston have been asked whether they wanted this monstrous mass of masonry to tower above their narrow streets, or these other buildings which of course are forerunners of future buildings which will darken them. These buildings were put up by the few by taking advantage of lax building laws, in utter disregard of the needs of the many, and, so far as real estate values are concerned, by the vertical instead of the lateral development of the city they have simply robbed Peter to pay Paul, the suburban real estate man losing in proportion as those in the congested districts gain.

The high building *per se* is not an evil when it is well treated on all four sides and shaped like a tower, and when it is surrounded on all sides by ample space; however, such a building, so far as I know, does not exist in the world, and need not be discussed. The high building as it exists is an unmitigated evil to the many, while it is a convenience to the few, and to those few only so long as they can prevent their neighbors from taking advantage of the laxity of the law and following their example.

This view of the noblest specimen of Richardson's architecture in America was recently threatened by the erection of the building on the right to the height of the base of the tiling on the tower. By the strenuous efforts of public-spirited citizens with the Legislature, the building was prevented from exceeding its present height.

Boston now limits its buildings to a height of 125 feet, or to two-and-a-half times the width of the street; this is much less than the limit in Chicago and New York, and yet is far higher than is permitted in any city of Europe. In Paris, and in general through Germany, Italy, and Sweden, buildings are limited in height to the width of the street. In Berlin and Vienna houses must not have more than five habitable stories; in Brussels they must not exceed sixty-nine feet in height, and in London, the limit, with perhaps some exceptions on large open spaces, is eighty feet.

No country in the world is so reckless in its building laws as America. No country permits the idiosyncrasy or greed of the individual or corporation so to infringe upon the rights of the people and sane conditions of life.

It is claimed that modern business conditions demand the high office building, even if such a disfiguring apartment building as you see on this Boston street be unpardonable. Concentration and speed are certainly desirable, but pneumatic tubes, telephones, subways, and elevators in six-story buildings, together with a concentration of certain professions or businesses in different blocks or wards, is the only concentration needed where life is rational and well adjusted. Berlin and Paris do large business without skyscrapers. As compared with us, their business men make less money, but more of them get more out of life, and their wealth is not counterbalanced by the fearful squalor in certain sections which disgraces the rich young cities of our prosperous land. The modern office building is an example of uneconomic concentration. A hundred different businesses, manicuring, insurance, law, landscape gardening, editing, engineering and what not are massed together. Why should not lawyers have an office block of moderate height to themselves, and insurance men, and real estate men, and hide and leather men, each their own quarters? Would not business be equally well expedited and our cities freed from this pestilence which threatens at any moment to cut off the earnings of years from honest, helpless citizens? A hundred-foot building in Boston ruined a certain school by casting it in dense shadow. Another property belonging to a widow lost $1,000 rental by the perpetual twilight which its high neighbor threw over it. These are but two instances among thousands. Not until the common people are aroused to defend their vested interests at the polls and elect men who shall protect their rights by proper legislation can our cities hope to supply decent conditions, to say nothing of beauty, to modern life.

Delay is fatal. Every building compels others to be built in self-defense, and makes future reform intolerably expensive.

The preservation and improvement of natural beauties, as at Morningside and Central Park, New York, and especially the utilization of waterways, is a matter of prime importance. In Europe, waterways are almost always made accessible to the people and form a chief feature in the beautification of the city. With us, the river banks have usually been given over to purely commercial interests and are covered with dirty mills and warehouses, and not shaded with trees, like this view of the Seine or like the Thames Embankment.

Contrast the Merrimac at Haverhill with the Rhine at Mayence or Cologne, or with this view in the business center of old Nuremberg. Or contrast the Alster basin at Hamburg with the present surroundings of the Charles River basin in Boston, or the borders of the little river that flows through Berlin with the borders of any river that flows through any important city in our country, and our failure to utilize great, natural opportunities is apparent.

The question of environment, of a suitable setting to whatever has a monumental character, is the next most vital question. In spite of the fact that in many fields we are now producing much better architecture than is the continent of Europe to-day, our people and our city fathers are singularly deficient in demanding that it shall have a proper setting. Admirable buildings are placed in narrow streets or are sandwiched in between others of discordant form and color.

The accompanying view of Paris illustrates the monumental treatment of the Madeleine, which is balanced on the opposite side of the bridge by the Chamber of Deputies, of similar architecture. Ample space and symmetrical arrangement prodigiously enhance the effect of every building. In the dressing of shop windows, in the arrangement of flowers and in many minor matters we have learned to avoid the hodge-podge and heterogeneous and to strive for unity and harmony. That we have not done this in our street architecture and in the setting of public buildings is due not so much to our bad taste as to our bad politics and our inveterate prejudice in favor of unregulated individual taste. This individualism permits, as regards private buildings, any dozen men who happen to own each a twenty-five-foot front lot in a given block to mass together a dozen buildings each of different style and color and height and of different materials. The Paris law which requires a certain uniformity of sky line, cornice and balconies and harmony of color in any given block would be a boon to every American city. With reasonable laws, our finer building materials, more brilliant colors, and greater beauty in city domestic architecture would make our cities far excel in beauty any in the old world. No freak or monstrosity would be permitted and the subordination of each unit to the whole would increase rather than diminish the beauty of each, as was evident at the World's Fair. We should simply exchange unbridled license for true freedom and have ample scope for any genuine individuality that was worth while.

The setting of all works of art is of about equal importance to the merit of the work of art itself. Of what value to Boston is this statue of Samuel Adams with its present background?

Contrast it with this statue and its leafy background in the Thiergarten at Berlin.

Who cares for this statue of Lincoln freeing the slave amid such sordid surroundings? Would not even St. Gaudens's noble statue in Lincoln Park lose half its value were it transferred from its perfect environment and placed here?

Would this Gothic fountain in Nuremberg have its full charm were it not for the ample space about it and the Gothic features of its background which accentuate its own loveliness?

In the detached suburban house of flimsy wood exists one of the greatest obstacles to beautiful city life. Here jig-saw trimming, grotesque gables and excrescences and patches and stripes of various colors often make as unpleasant a conglomeration of lines and proportions as the world can show. The dangerous crowding of such buildings as the city extends its limits makes the detached house (only three or four feet from its neighbors) worse than a brick block in respect to danger from fire. The law should prohibit any wooden building being erected within fifty feet of another building of wood. Continuous blocks of broad, shallow brick houses built around large, open squares give all the advantages of air and light and more privacy than the wooden house squeezed in between others. It can be made architecturally beautiful and harmonious, and, as is shown by many delightful modern English residences of brick for persons of moderate means, is far better than the fantastic possibilities of the average American wooden suburb. This important matter also deserves a separate lecture.

Among less important matters for consideration, the growing nuisance of the huge advertising bill-board deserves attention. Were it not so temporary in character, and so certain to be abolished as soon as an aroused public shall demand it, it might be considered a matter of great moment, as indeed it is for the time being. The desecration of rock and cliff and forest by the advertising fiend would seem to have reached almost the limit of endurance were it not that those who suffer consider themselves so helpless in the matter. In Massachusetts a law has been passed whose enforcement will materially modify the disfigurement of roads. It should be the duty of all citizens to make inquiry of town authorities whether permission has been given when any advertisement appears upon highways and town property. In nine cases out of ten in Massachusetts no such authority is given, and the good citizen is in duty bound to see that the offender removes the offense or is prosecuted.

It is an American vice to condone lawlessness. Under the plea that one does not want to preach and meddle and find fault, the community suffers from the individual's unwillingness to take a little trouble. The good citizen will not be pugnacious, but, on the other hand, neither will he be pusillanimous.

Though the law protects the rights of the ear and nose, and whistles, bells, and odors are more or less under control, the rights of the eye have received scant justice. All the finer feelings may be outraged and one's property be diminished in value by such a blot on nature as the one before you on the screen, but up to date the law in Massachusetts, and probably in other States, gives no redress.

This bill-board cuts off a pretty view, which view was the inducement to one of the residents behind it to purchase his home and spend money in repairs. He would not have done it had he foreseen this daily torment to his eyes. The amounts paid for disfiguring a whole landscape are ridiculously small. The chief advertising agent in Boston pays only $10 to $25 annually for the

* Paper read before the Second Convention of the Architectural League of America, Chicago, June 8, 1900.

BACK NUMBERS WANTED.

SUBSCRIBERS, or others, having copies of the January, 1900, issue of the BUILDING EDITION which they wish to dispose of will please communicate with the publishers, who are desirous of securing additional copies. A reasonable sum will be paid. Address Munn & Co 361 Broadway, New York.

THE THÜNA HALL—NORTHEAST CORNER.—See page 96.

opportunity to ruin a whole landscape. The average person is as blind to these disfigurements as a newsboy is oblivious to bad grammar. Eyes he has, but the cataract of commercialism has grown over his sight, so that, to a great extent, he sees neither beauty nor ugliness, nor knows a good thing or a bad thing when he sees it.

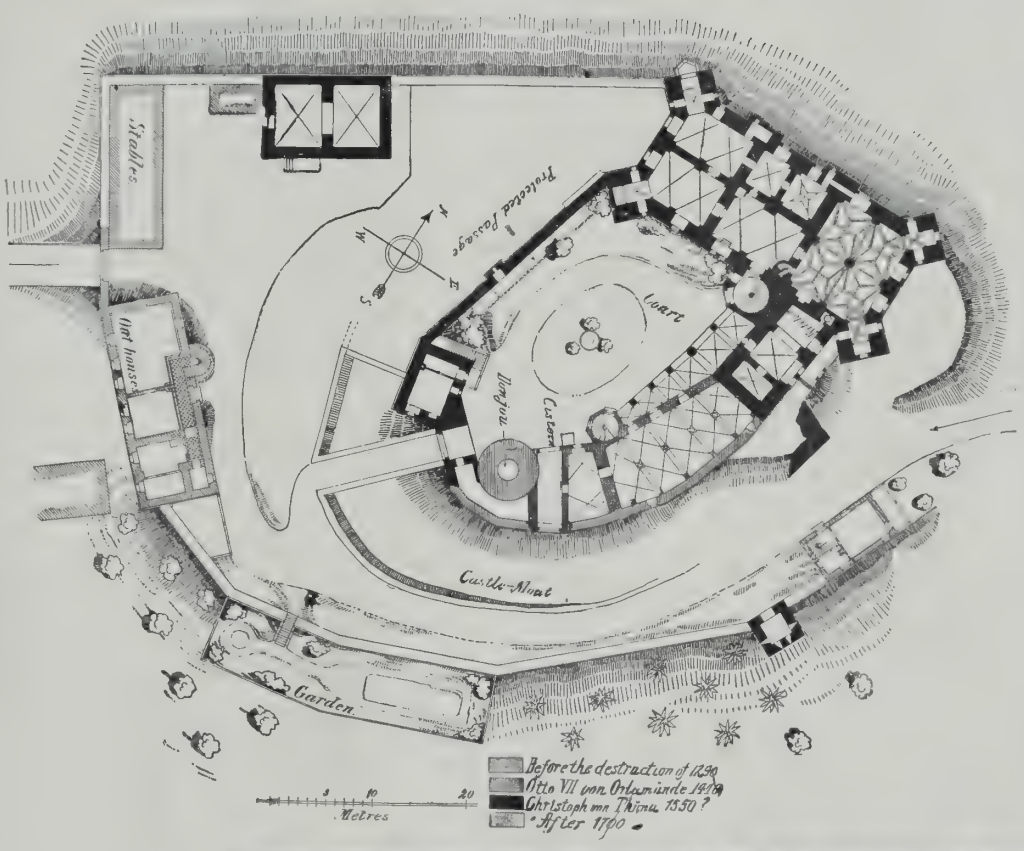
The man who put up this advertisement which shuts out that beautiful landscape which you have just seen, pays $2,000 taxes, and gets paid only $100 a year for allowing this monstrosity to appear on his property.

To whom shall we look for the remedy from the evils which have here been thus briefly outlined?

Certainly not to artists especially, for, strangely enough, a man may be an expert and enthusiast on bronzes and water-colors and book-covers, and be as indifferent as a street-sweeper to the ugliness of sky lines and bridges and posters. Moreover, if he does see, and suffer in the seeing, he may have no power of initiative for reform. I fear we can not look to the daily press, for it, for the most part, must print only what stockholders and advertisers find it for their advantage to have printed. Certainly not to the children, though they are learning to draw and are studying Perry pictures; they can do nothing before much of the evil will become irreparable. We can not wait for the next generation to do our work. And most certainly we can not look to wealthy patrons of art to help much in beautifying our cities. In spite of many generous public gifts the millionaires can do nothing of great importance in producing beauty *until they cease promoting that very legislation which now protects their class in producing ugliness.* The skyscraper, the chimney belching forth black soft-coal smoke, the huge advertisement in the landscape which swears in stentorian tones at every passer-by—taking God's world in vain—these are things which the rich as a class will not help remove, for they belong to them.

To whom then shall we look for a remedy? *To the good citizen.* It is not necessary that the good citizen should know anything about art. It is necessary that he should care for the needs of God's creatures, that he should respect the love of beauty, and that he should have common sense. He may not know Gothic from Greek, but he must know that he does not know, and that questions of beauty must be left to experts of beauty, just as questions of public health must be left to experts in the science of health. He must know enough to vote for an honest alderman to do likewise. He must be willing to set his individual whim aside and be glad to submit to the regulations and counsels of a board of beauty.

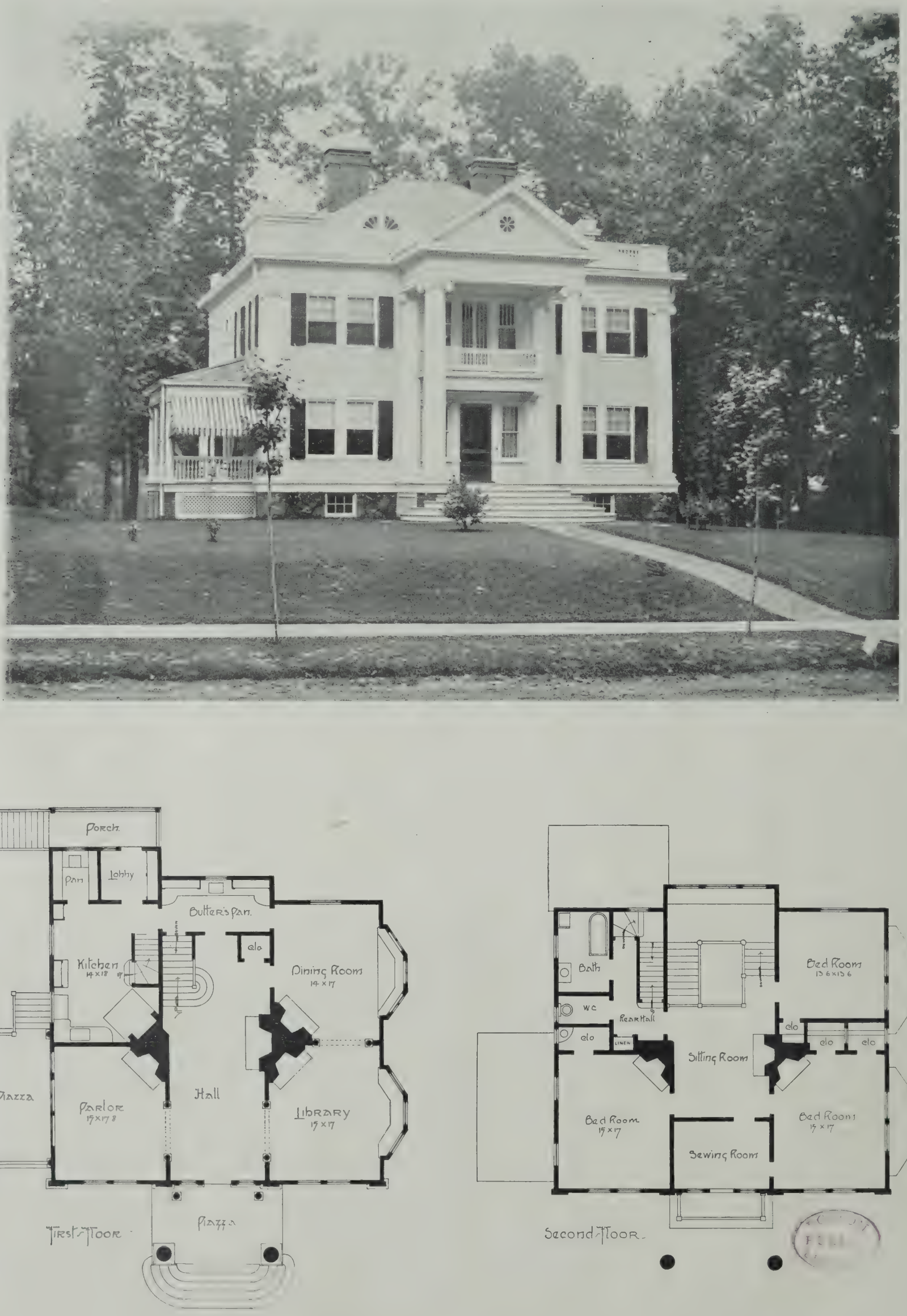
A board of beauty made the White City the glory and the marvel that it was. When the good citizen forces partisan politics to know its place and not intrude where it has no business to be, then such a board he must again call into requisition and let knowledge and taste give counsel and even prohibitory laws to ignorance and whim. The man, for instance, who fancies yellow brick and wants to put a yellow brick house into the midst of a brown-stone block, like a slice of sponge cake set on edge, must be taught that no man buildeth to himself, because no man liveth or dieth to himself: that we are all members one of another, and thus no man in a civilized community may mar his neighbor's little plot by doing what he pleases with his own. The good citizen will find this no tyranny, but a welcome protection from his neighbor's follies. In proportion as he attains to beauty of holiness in his citizenship will he recognize the holiness of beauty in his city.—Inland Architect.



The Color of Blinds.

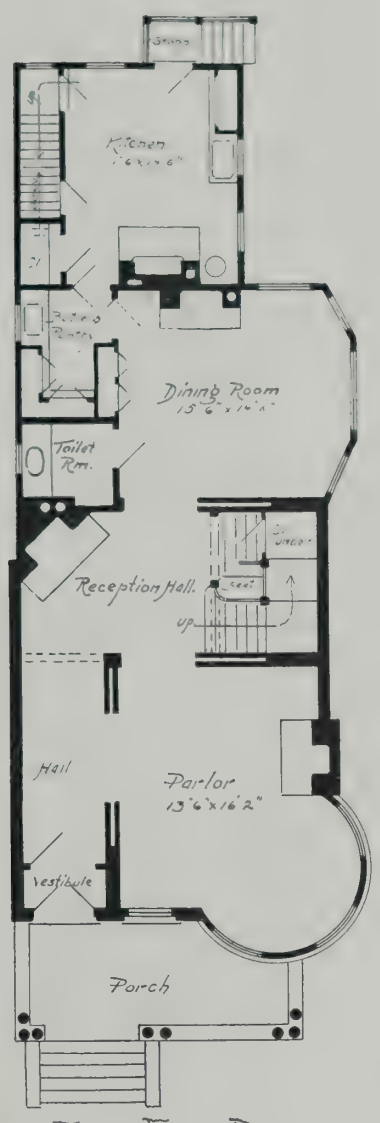
THE remarkable and widely varying properties of the elementary colors which compose white light suggest that the employment of screens as in the blinds placed over our windows should be founded on a scientific basis, says the London Lancet. Our knowledge of the properties of each individual section of the spectrum is not exact, but this much we do know, that the rays of least refrangibility, the red rays, are without direct chemical effects—they occur at the heat end of the spectrum. On the other hand, the rays of the highest refrangibility contain the violet rays, which chemically are exceedingly active. It is these rays which are concerned in photography and doubtless also in the great processes of vegetable nutrition and growth. The object of blinds is, of course, twofold—to keep a room cool and to screen out some of the light, so as to avoid the bleaching of coloring materials of the carpets and furniture. At the same time sufficient light must be admitted so that the occupant may see without difficulty. What, then, is the best color for this purpose? Since light exerts the peculiar action due to the actinic rays which materially and wholesomely affect the air of a dwelling-room, care should obviously be taken not to exclude all the rays that are so concerned. Thus ruby or orange-red material would be contra-indicated. Abundance of light is inimical to the life of micro-organisms, so that a material in some shape of a compromise should be selected. The best for this purpose is probably a delicately ochre-colored fabric. This would screen part of the active light rays, and if of a fair thickness the greater part of the heat rays, while admitting sufficient active rays to allow of a wholesome effect upon the room and its surroundings. Venetian blinds do not allow of the graduation, which is desirable, of the tone of light which may be adjusted with cloth fabric. As is well known, exclusively red light has been used as a therapeutic agent, and apparently with encouraging results, in measles.

THE THÜNA HALL—SOUTHWEST CORNER.—See page 96.

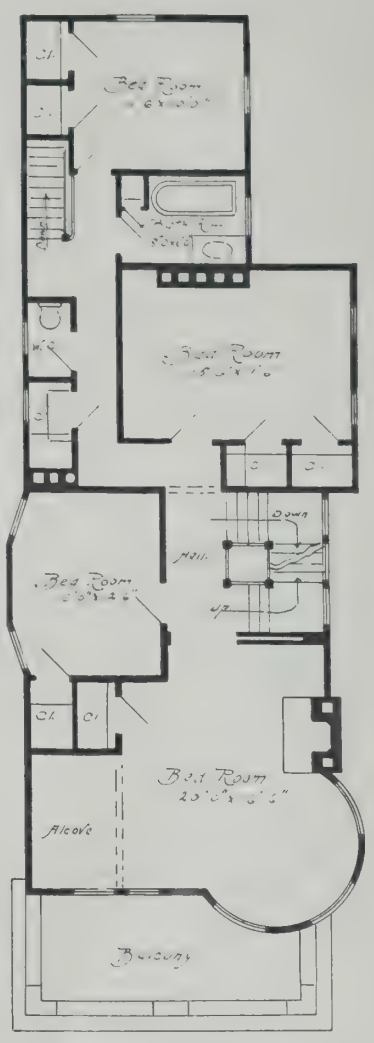


A COLONIAL RESIDENCE AT MONTCLAIR, N. J.—See page 96.

MR. E. R. NORTH, ARCHITECT.



FIRST FLOOR PLAN.



SECOND FLOOR PLAN.

A MODERN DWELLING AT NEWARK, N. J.—See page 96.

MESSRS. HURD & SUTTON, ARCHITECTS.

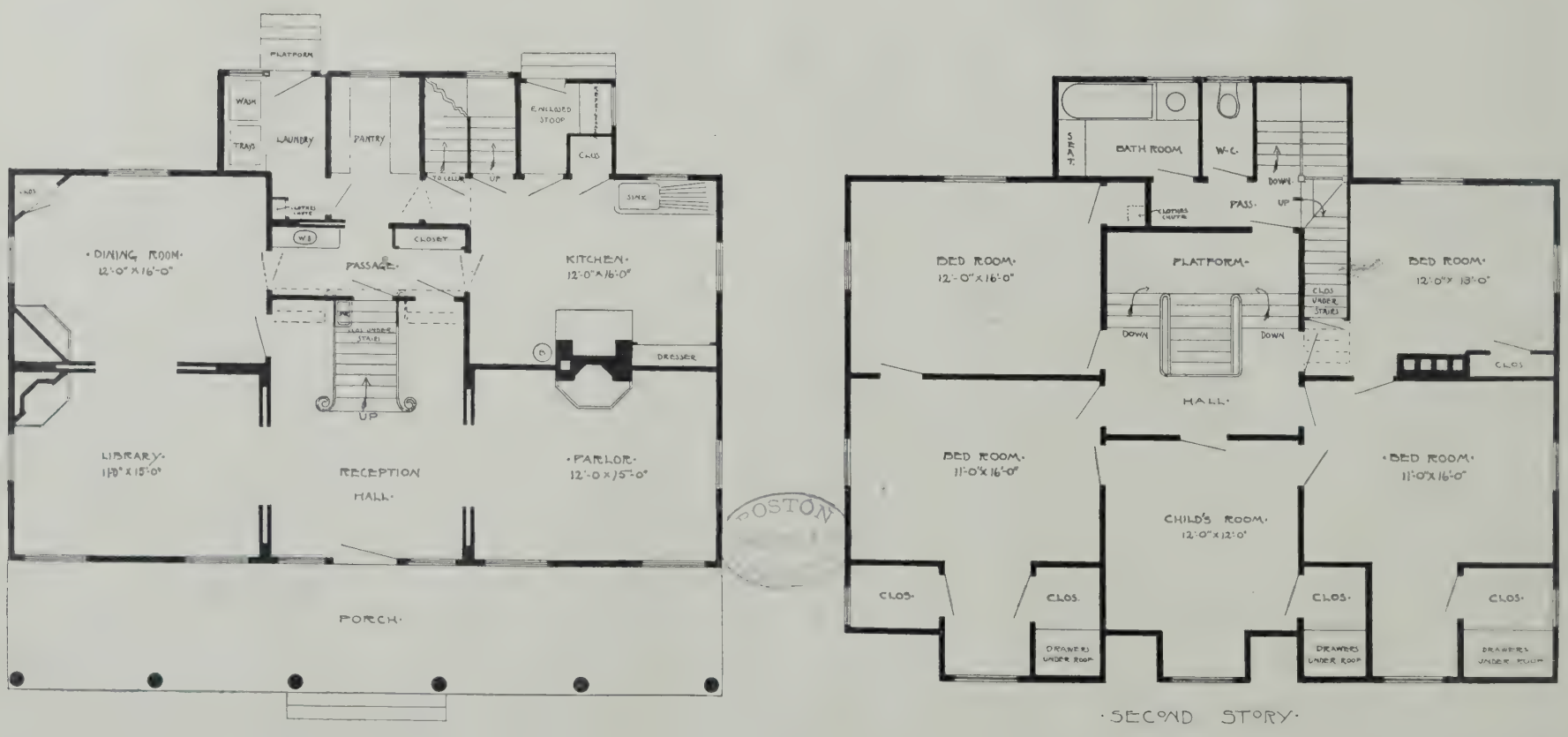
BOSTON PUBLIC LIBRARY

A MODERN SUMMER RESIDENCE AT ALLENHURST, N. J.—See page 97.

COAST LAND IMPROVEMENT COMPANY, ARCHITECTS.

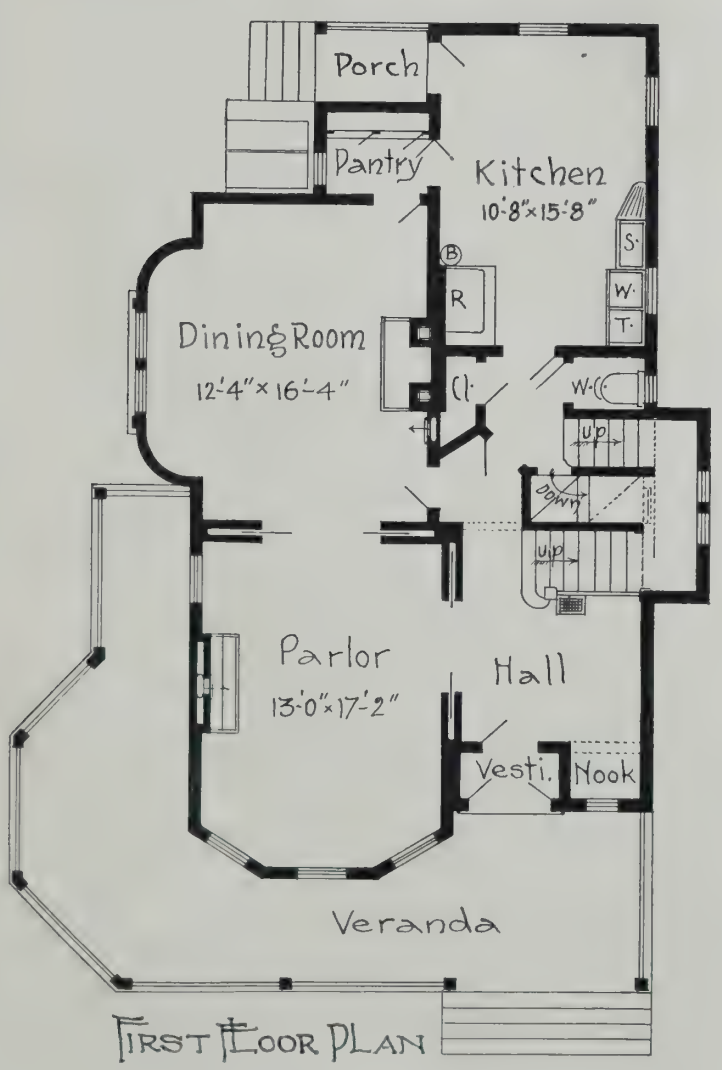
A MODERN SUMMER RESIDENCE AT ALLENHURST, N. J.—See page 97.

COAST LAND IMPROVEMENT COMPANY, ARCHITECTS.

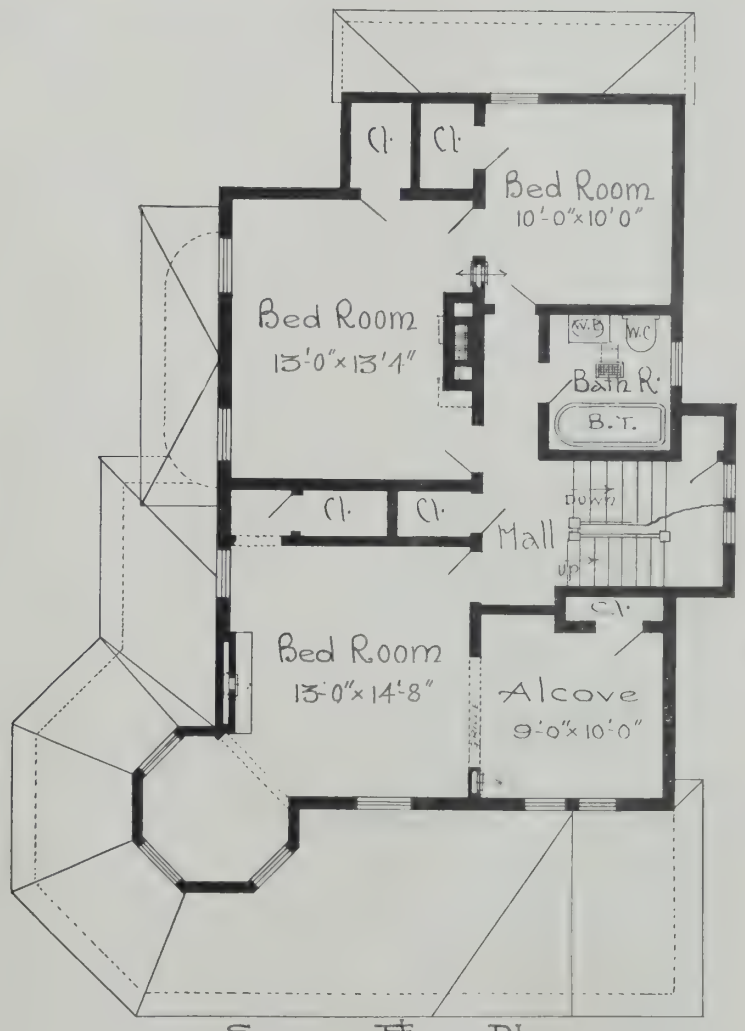


A BUNGALOW RESIDENCE AT FOREST HILLS, NEWARK, N. J.—See page 97.

MR. CHARLES P. BALDWIN, ARCHITECT.



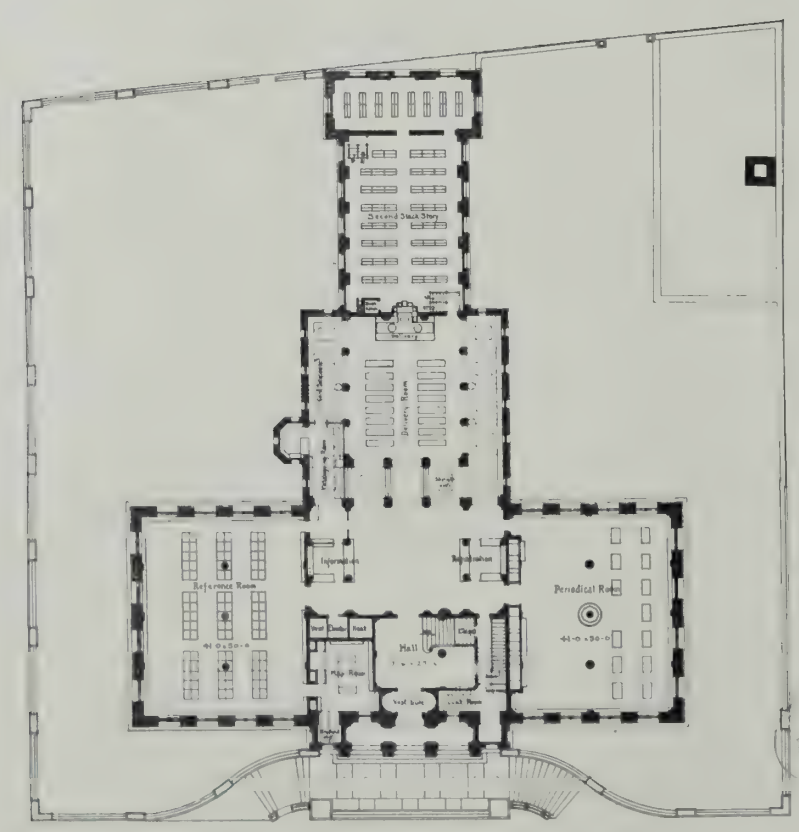
FIRST FLOOR PLAN



SECOND FLOOR PLAN

MODERN DWELLINGS FOR SMALL SUBURBAN LOTS.—See page 97.

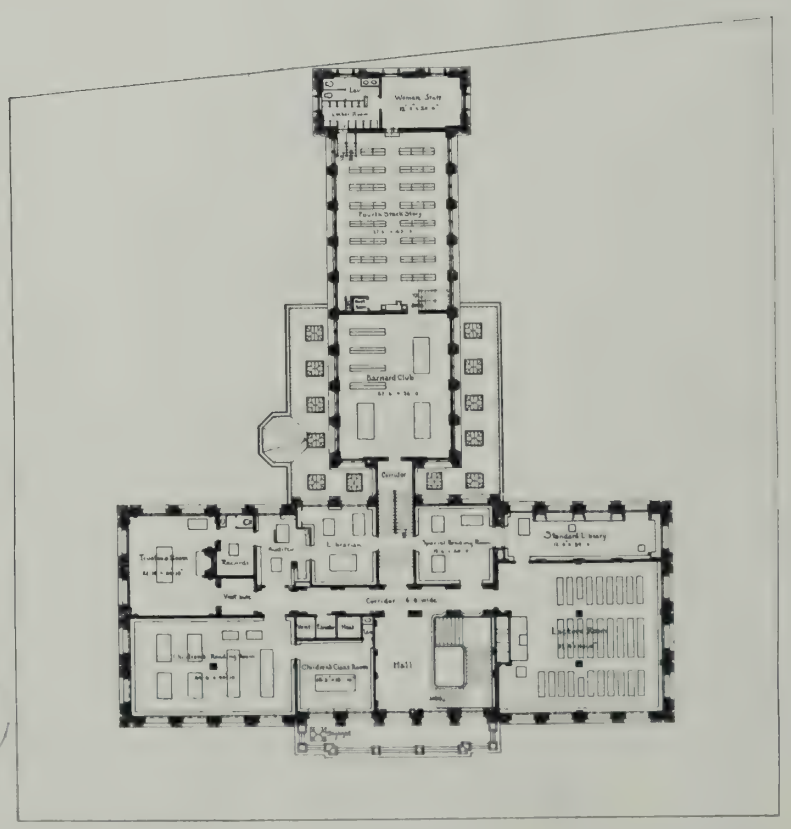
MR. BENJAMIN DRIESLER, ARCHITECT.



PROVIDENCE PUBLIC LIBRARY
1896 - 1900.

FIRST STORY PLAN.
Scale - 1/16" = 1 foot

Stone, Carpenter and Willson, Architects.
49 Westminster St. Providence, R.I.



PROVIDENCE PUBLIC LIBRARY.
1896 - 1900.

SECOND STORY PLAN
Scale - 1/16" = 1 foot.

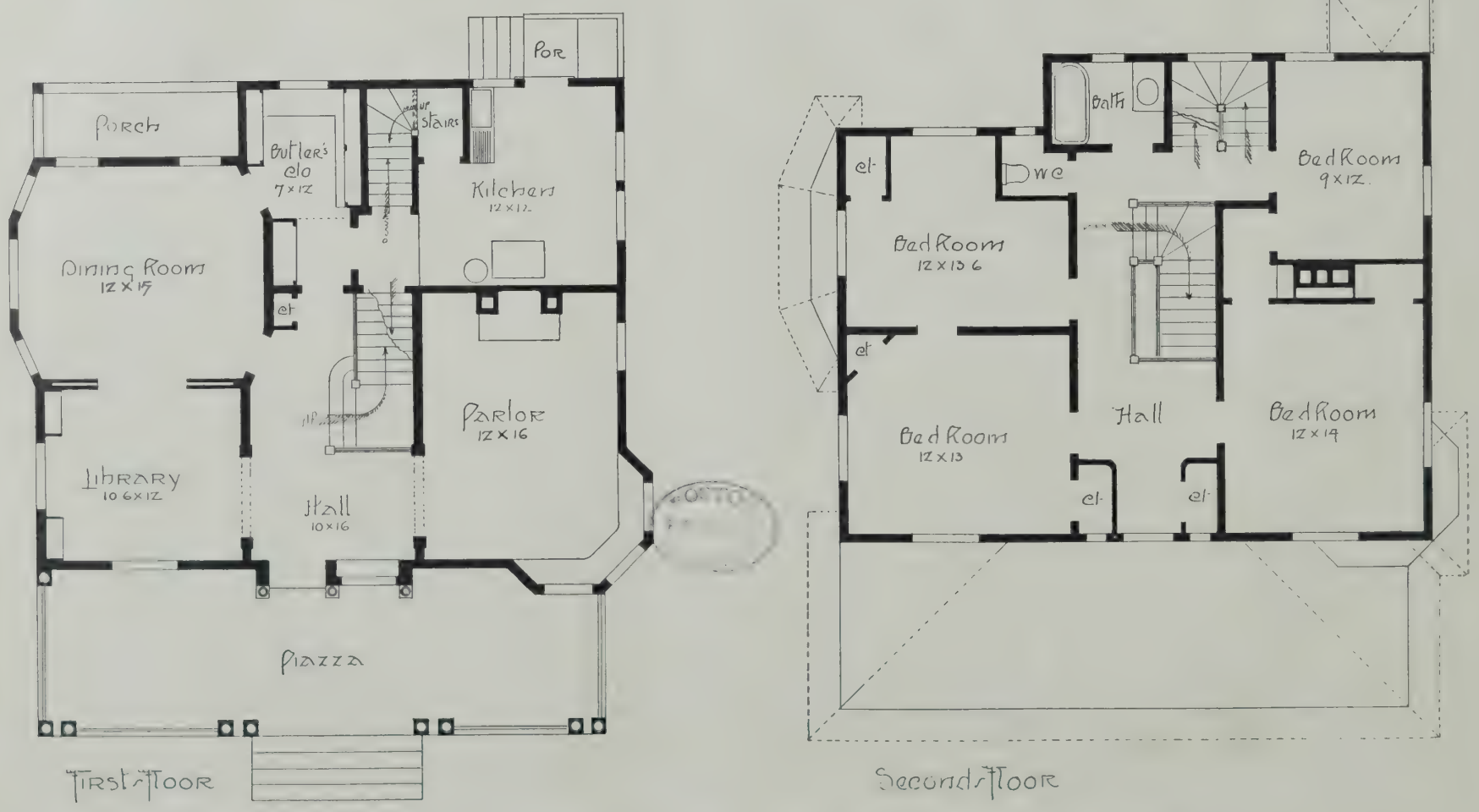
Stone Carpenter and Willson, Architects,
49 Westminster St. Providence R.I.

THE NEW PROVIDENCE PUBLIC LIBRARY, PROVIDENCE, R. I.—See page 97.

MESSRS. STONE, CARPENTER & WILLSON, ARCHITECTS.

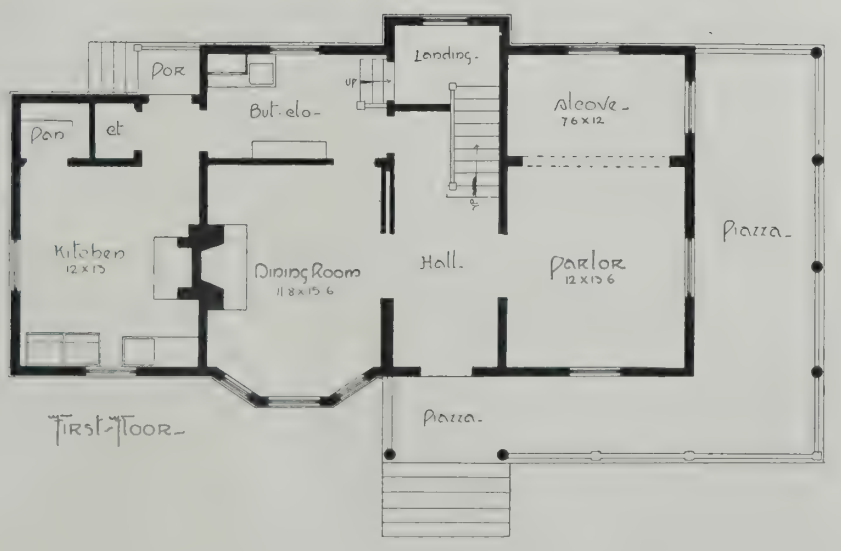
THE NEW PROVIDENCE PUBLIC LIBRARY, PROVIDENCE, R. I.—See page 97.

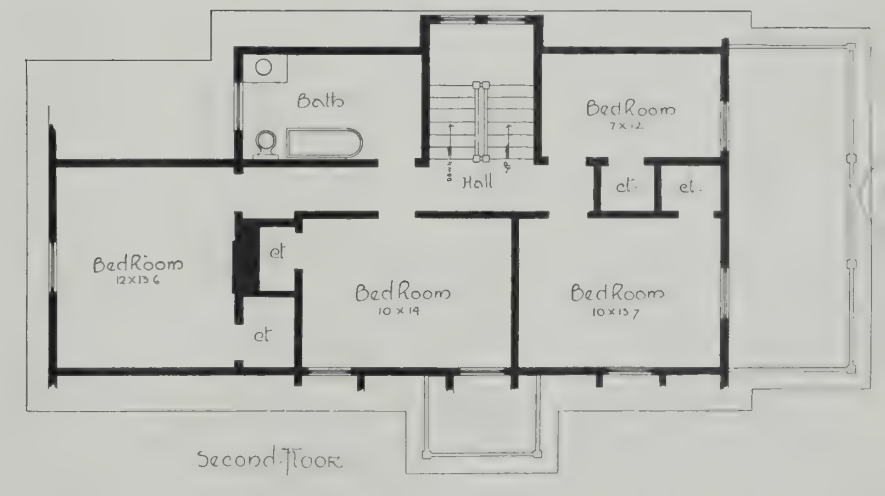
MESSRS. STONE CARPENTER & WILLSON, ARCHITECTS.



A COLONIAL DWELLING AT UPPER MONTCLAIR, N. J.—See page 98.

MR. CHRISTOPHER MYERS, ARCHITECT.





A MODERN DWELLING AT NEW UTRECHT, BOROUGH OF BROOKLYN, N. Y.—See page 98.

MR. GARDNER ABBOTT, ARCHITECT.

AN ELIZABETHAN RESIDENCE AT ERWIN PARK, MONTCLAIR, N. J.—See page 98.

MESSRS. McILLVAINE & TUCKER, ARCHITECTS

GERMAN NATIONAL PAVILION AT THE PARIS EXPOSITION.—See page 96.

CASTLE OF LAUENSTEIN.

Lauenstein Castle is situated in Lognitzthal, one of the most romantic and beautiful portions of the Thüringer Wald (Thuringian Forest), and is at present owned by Dr. E. Messmer, who several years ago restored it to its former condition and transferred to it his valuable collection of old furniture and weapons.

The castle was built in the tenth century during the reign of Kaiser Heinrich I. der Finkler (Henry the Fowler), and was used as a stronghold by the Counts of Henneberg—a house now extinct, but at that time a wealthy and powerful family that ruled a large portion of the Thüringer Wald. In the eleventh century, Lauenstein passed into the possession of the Counts of Orlamünde, who retained it until 1430. In 1299 the castle was destroyed by Kaiser Rudolph I. of Hapsburg because the Counts of Orlamünde had committed many robberies—crimes common enough among the robber barons of that period. About 1400, Count Otto VII. of Orlamünde erected magnificent new buildings, which have been partly preserved to this day. In 1430, Lauenstein was acquired by the Counts of Schwarzburg, who sold it to the Heimburg family, after which it passed into the hands of the Counts of Saldeneck, and later of the Counts of Mansfeld.

In 1506, Freiherr Friedrich von Thüna bought the castle. He had made the acquaintance of Martin Luther while in the company of Kaiser Karl V. at the Reichstag in Worms, and soon promulgated the principles of the Reformation in his possessions. He suppressed an uprising at Ludwigstadt during the Peasants' War (Bauernkrieg) with considerable severity. His son, Christoph von Thüna, was an art-lover, and by his command the great wing which occupies the northern side of the castle court was built about 1550.

In 1622, the Margraves of Kulmbach-Bayreuth acquired possession of Lauenstein, but left its government entirely in the hands of administrators. In 1791 Lauenstein passed by heredity to Prussia, and in 1813 by exchange to Bavaria. The Bavarian government, desiring to save the expense of maintaining the castle, sold it, so that it passed into the possession of an association of a number of poor persons in the vicinity, who allowed it to fall into decay, and rented it to peasants engaged in the manufacture of slate. From these peasants the present owner, Dr. E. Messmer, purchased the old castle and restored it to its former splendor.

In restoring the castle the architects endeavored, so far as possible, to adhere to the original structure and character of the various buildings. It was found that the foundation walls of the donjon (the round tower at the entrance), which was the last place of refuge during a siege, was built with the Roman bond (Opus spicatum), and consisted of a walled structure having obliquely placed courses alternating from right to left. In German castles masonry of this kind is found only up to 1200.

Particular pains were taken in rebuilding the beautiful arched hall of state in the wing erected by Thüna. The walls contained the escutcheons of all the former Castellans. The Munich painter Kellner is at present engaged in decorating the great hall of the Orlamünde wing with mural paintings, which portray the history of the Counts of Orlamünde. The wooden ceilings in the upper story have all been restored to their original form, with the assistance of those portions which still remain. In furnishing the rooms only medieval chairs, tables, and upholstery have been used, most of which date from the very erection of the castle.

The protected passage on the western side of the castle court has been constructed of richly carved pieces of wood which Dr. Messmer purchased in Nuremberg. In the lowermost cellar of the castle is a narrow, arched passageway, which leads outside of the castle walls, and probably served as a means of escape during an assault.

We present several illustrations on pages 81 and 83, for which, with the history of the castle, we are indebted to the architects of the restoration, Messrs. Lehmann and Wolff, of Halle a. S., Germany.

GERMAN NATIONAL PAVILION AT THE PARIS EXPOSITION.

The German National Pavilion at the Paris Exposition, which we illustrate on page 95, attracts attention by its architectural design and its exterior decoration. It represents an edifice in the style of the sixteenth century. In the front, facing the Seine, is an arched doorway surmounted by a balcony; at each end of the latter is an armed figure of a warrior. Over the central window is the national emblem, surrounded by a decorative fresco in colors. Above this rises a gable roof, with its beams finished in buff and gold. On the right hand is a turret with arched windows, and on the left rises a tall belfry decorated with frescoes. The arrangement of the sides and rear carries out the same general design; a portion of the right-hand side is formed of carved woodwork of pleasing effect. From the main doorway a central hall is reached, which has a vaulted ceiling with fresco designs in green and gold. On one side the frieze represents a view in the city of Mainz, and on the other Leipzig. This room is devoted to a collection of books exhibited by the principal German publishing houses, and many fine specimens of typography, color impression, and binding are to be seen, besides sets of engravings and bound volumes of the leading illustrated periodicals. This collection is continued in a smaller room which opens into the former, and next to it is the reading-room, handsomely finished in carved wood; here are to be found most of the leading newspapers and periodicals. Another room adjoining it contains a large collection illustrating the different engraving processes and color printing, and a large number of specimens are to be seen. A collection of type in all sizes and characters, engraved plates, etc., is shown in another large room. Photographic apparatus of all kinds has a room specially devoted to it; in the centre are to be seen a number of cameras of all sizes, representing the leading firms. Around the walls are a number of cases containing exhibits of lenses and smaller apparatus, shown by Zeiss, Steinheil, and others, also the different developers and chemical products of the Aniline Works, of Berlin. Professor Wolf, of Heidelberg, shows a fine collection of astronomical photographs of the Milky Way, nebulæ, etc.

The main rotunda is situated in the rear of the building. On either side a staircase leads to the second story. In the centre of the rotunda is a marble bust of the Emperor William. The staircase is highly ornamental, having a marble balustrade and base, the central part being in repoussé brass of very rich design. At the commencement of the staircase is a large figure of a warrior in carved wood, and at the first landing a candelabrum of repoussé bronze carrying three globes. The walls and ceiling of the rotunda are decorated with large frescoes, framed in gilded stucco, and with various designs in color. At the top is a balcony overlooking the rotunda, having a carved oak figure at each extremity; opposite is a fine stained-glass window.

The upper story, like the lower, contains a number of rooms, in which different collections are to be found. One room is devoted to the various charitable institutions and co-operative associations of Germany. Upon a large platform in the centre are mounted a number of models of different institutions, workingmen's houses, co-operative apartments, etc. The walls are covered with photographs showing similar institutions. Another room is devoted to various *éditions de luxe*, illustrating the bookbinder's art, engraving, and typography. One book especially noted contains specimens of typography from the time of Gutenberg and Faust down to the eighteenth century. The main point of interest is, however, a series of rooms which are a reproduction of those of the palaces of Sans-Souci and Potsdam. Of the former, two of the apartments of Frederick the Great are shown in exact reproduction, and the original furniture has been brought here from the palace. The two rooms shown are the salon and the library; in the former the ceiling and frieze are in silver arabesque decoration, the walls are in buff tapestry, in the centre is a chandelier of Dresden porcelain, with two others of crystal at the ends. Above the mantel is a large mirror, framed in silver. In the centre of the room is a table of carved wood incrusted with silver; most of the furniture is carved and gilded. Among other fine pieces is a clock of inlaid wood and bronze. The room contains a number of busts, and a bronze figure representing Frederick the Great, besides a collection of paintings of the early French schools. Adjoining the main salon is the library, a small room of elliptical shape; the ceiling is finished in gold and white, with a rich bronze chandelier. The two remaining rooms are reproductions from the palace of Potsdam, and contain also the original furniture. One of these is finished in gilded stucco and red tapestry, and contains some fine pieces of furniture; the other, a smaller room, is somewhat similar, being finished in green Both rooms contain a number of fine paintings.

A COLONIAL RESIDENCE AT MONTCLAIR, N. J.

We present as the subject for colors, and also on page 84, in this issue, a modern residence of Colonial treatment, which has recently been erected for Charles T. Ives, Esq., at Montclair, N. J. The engraving presents an excellent design for a suburban house. It is carefully treated with good detail, and is an excellent example of a pure style of Colonial architecture. It has many features, including a portico at front, with Ionic columns rising up two stories in height and supporting same. The underpinning is built of red brick laid up in red mortar. The superstructure is built of wood in a thorough, substantial, and workmanlike manner. The exterior framework is covered with clapboarding and then painted a pure white. The roof is covered with shingles and stained a moss green. Dimensions: Front, 42 ft.; side, 36 ft., not including piazzas or bay windows. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The house is planned with a large central hall, containing a large open fireplace and a grand staircase. This hall is trimmed with quartered oak, and it has a high paneled wainscoting. The fireplace is built of brick, with hearth and facings of tiles, and mantel of exceptional design. The staircase is of handsome construction, with carved newel posts, balusters, and rail; the whole of which rises up to a broad landing provided with a paneled seat. The openings between hall, parlor, and library are provided with nine-inch Ionic columns; similar columns support a circular arch of quartered oak. The parlor is trimmed with pine, and is treated in a most artistic manner with Devoe's white enamel paint. It has an open fireplace, furnished with white enamel tiled facings, and hearth and mantel of exquisite design. The library and dining-room are trimmed with plain oak. Each apartment has a bay window thrown out at side, the ceilings of which are dropped down so as to form a recessed effect, and are provided with paneled seats. The fireplaces have tiled trimmings and mantels. The butler's pantry is trimmed with North Carolina pine, and is fitted up with bowl, dresser, cupboards, and closets. The kitchen is trimmed with North Carolina pine, and is furnished with a large well fitted up pantry, dresser, sink, entry large enough to admit ice-box, and a fireplace containing a Thatcher range. The second floor is trimmed with white pine and treated in white. This floor contains a large open hall, which is used as a sitting-room, and is provided with an open fireplace, besides three bedrooms, five large closets, sewing-room, and bathroom, the latter wainscoted and furnished with a Standard porcelain bath-tub, Ronalds & Johnson fixtures, and exposed nickelplated plumbing. The third floor is also trimmed with white pine, and it contains two bedrooms and trunk-room. A cemented cellar contains laundry, servant's bathroom, cold storage-room, a Thatcher furnace, and other necessary apartments. Mr. John S. Carlson, carpenter; A. A. Rigler, mason; J. S. Crane, plumber; Charles L. Bush, painter, all of Montclair, N. J. The mantels and tiling were furnished by Bradley & Currier. Mr. E. R. North, architect, 299 Bloomfield Avenue, Montclair, N. J.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODERN DWELLING AT NEWARK, N. J.

We present as the subject for our illustration on page 85, in this issue, a modern dwelling, which has been erected for Mr. Albert L. Babcock, at Newark, N. J. The design presents a very excellent example for a dwelling suitable for a narrow city lot, combining both good elevations and well arranged plans. The underpinning and front porch up to level of first-story window sills are faced with rock-faced Indiana limestone. The first story is built of buff-colored pressed brick. The second and third stories are built of wood, and the exterior framework is covered with sheathing, paper, and shingles. The roof is also covered with shingles. Dimensions: Front, 21 ft. 6 in.; side, 58 ft., not including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The entrance is through a vestibule, which has a quartered oak paneled wainscoting and a tile floor. A narrow hallway leads to a reception hall, from which entrance is obtained into parlor and dining-room. This reception hall is trimmed with quartered oak. It has a paneled wainscoting and an open fireplace, furnished with tiled hearth and facings, and mantel. The staircase is a very handsome one, and it has a newel post rising up and supporting an archway. The parlor is trimmed with white pine and treated in white enamel. It has a circular bay window at corner of room, and an open fireplace furnished with white enamel tiling, and a mantel of dainty design. The dining-room is trimmed with quartered oak, and it is provided with a paneled wainscoting, a very handsome buffet built in, with carved columns, mirror, and a leaded stained glass window over same. It also contains an open fireplace, provided with tiled facings, and hearth, and mantel of oak, with columns and mirror. The floors are laid with quartered oak. The kitchen and butler's pantry are trimmed with yellow pine, and are fitted up with all the best modern fixtures complete, including a Richardson & Boynton Perfect range. The second floor contains four bedrooms, seven closets, and bathroom, the latter furnished with a tiled wainscoting, paved floor, and a Standard Manufacturing Company porcelain lined tub, Brighton closet, decorated Trenton ware bowls, and exposed nickelplated plumbing. The large bedroom at front has an alcove and an open fireplace, with tile trimmings and mantel. Central bedrooms have similar mantels. The third story contains two bedrooms and a large trunk-room. The woodwork in second and third stories is painted white enamel, and the walls are tinted in delicate colors. A cemented cellar under the entire house contains a Richardson & Boynton furnace, coal bins, cold storage pantry, laundry, with Alberene wash trays, and other necessary apartments. Cost, $8,500, complete. Messrs. Hurd & Sutton, architects, Prudential Building, Newark, N. J. The contractors were as follows: Masonry, Geo. Hogan; carpentry, Lysat & Boyd; plumbing, J. C. McGuire; painting, D. D. Harrison; electrical work, E. Dowden. The mantels and tiling were furnished by E. H. Harrison & Bro., all of Newark, N. J. The gas fixtures were furnished by Cassidy & Son, of New York.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODERN SUMMER RESIDENCE AT ALLENHURST, N. J.

WE present herewith, on pages 86 and 87, in this issue, a modern summer residence, erected for N. W. Anthony, Esq., at Allenhurst, N. J. The design presented shows one of the most attractive houses at Allenhurst. All the elevations are good, and the whole *tout ensemble* is most pleasing, and, combined with well arranged plan, makes a summer house all that could be desired. The house is of the best construction. The materials used are the best of their respective kinds, and the workmanship is first class. The underpinning is built of brick laid up in red mortar. The superstructure is of wood, and the exterior framework is covered on the first story with clapboards, painted a dark bottle green; second story is covered with shingles and painted similar. The trimmings are painted ivory white. The roof is shingled and painted green. Dimensions: Front, 54 ft.; side, 50 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft. 6 in.; third, 8 ft. 6 in. The interior throughout is trimmed with white pine and treated with white enamel. The most attractive feature is the large living-room, which is entered from front piazza. This living-room is provided with a large open fireplace, recessed with nooks and seats on either side of same, and separated by a beamed arch, supported on columns with Ionic capitals. This fireplace is built of Roman brick, with hearth and facings of same, and finished with a neat wooden shelf. The library is separated by an archway and columns, and also staircase. The staircase is an attractive feature, with its broad treads, its broad landing, and its ornamental balustrade, which rises from one of the main columns which support the arch. Beneath the stairway is a coat closet, and at the rear a bicycle-room, with outside entrance thereto. The dining-room is separated from hall by a similar archway and columns. It contains a bay window with seat, and a plateglass window of large dimensions. The butler's pantry and kitchen and its apartments are trimmed with cypress, and are furnished up complete. The kitchen has an open fireplace containing a Richardson & Boynton range. The second floor contains five large bedrooms, with good closets, and three bathrooms. These bathrooms are furnished with the Standard porcelain tiled bath-tubs and J. L. Mott's fixtures, and nickelplated exposed plumbing. The third floor is trimmed with cypress, and it contains five bedrooms. A cemented cellar contains a Richardson & Boynton furnace and all necessary apartments. This house was designed and built by the Coast Land Improvement Company, of Allenhurst, N. J.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

MODERN DWELLINGS FOR SMALL SUBURBAN LOTS.

THE subject of this sketch, "Modern Dwellings for Small Suburban Lots," is prepared for the purpose of showing what kind of buildings of the detached type can be planned and designed for erection on plots of small dimensions.

In the suburban districts, where plots are divided into 20-foot widths, it requires two plots to make one lot of sufficient size for a dwelling of the dimensions of the subject of this sketch, which appears in this issue on page 89.

The next question of importance is to find out what kind of a house can be designed without taking up too much width, and to insure a perfect arrangement of rooms, with good light and ventilation, comfort, convenience, and simplicity, and to have the whole in keeping with buildings of this character, and maintaining all the requirements of a well regulated house. While it is comparatively easy for an architect to design and plan a building of this character, it shows much skill and forethought on the part of the architect in preparing plans for a building to be erected on a forty-foot lot, and to have it contain both attractive and pleasing elevations and well arranged plans.

The illustration which we present on page 89 gives a design for a cottage, erected for Mrs. A. Whiley, at "King's Oaks," a suburb of Brooklyn, N. Y. The design shows a type of house for a narrow lot, and is a very attractive cottage, with its surroundings of oak trees. It has special features, including a well shaded piazza and a tower, which adds dignity to the building. The underpinning is built of brick and is laid up in red mortar. The superstructure, of wood, is covered on the exterior framework with sheathing, paper, clapboards, and shingles. The first story is painted yellow, and the second and third stories are stained a butternut brown, made by Berry Bros., while the trimmings throughout are painted ivory white. The roof is covered with shingles and stained a bright red. Dimensions: Front, 29 ft. 6 in.; side, 44 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior plan is well arranged, and is treated in a handsome manner. The entrance is through a vestibule into a hall, which is trimmed with quartered oak. It contains an attractive nook, and an ornamental staircase, with turned newels, balusters, and rail. These stairs rise up into a landing, which is thrown out into a bay window, provided with a cluster of small windows. This hall contains a six-inch stave batten wainscoting, with quirk moulding set in between each batten, presenting an antique effect. The parlor and dining-room are trimmed with quartered oak, and each is separated one from the other by sliding doors; the former has a false fireplace and hearth, with a hardwood cabinet mantel. The dining-room has a wainscoting the same as hall, and it contains an open fireplace, trimmed with tiled facings, and hearth, and an oak cabinet mantel. The butler's pantry is provided with drawers, shelves, and cupboards. The kitchen is trimmed with cypress, and it contains everything complete, including a hearth, provided with a "Rossmore" range. The rear hall contains a toilet, which is conveniently located, and a stairway to landing of main staircase and to cellar. The advantage in a rear hall and stairway being located as it is, is that access is had to both without going through the kitchen to reach same, which is quite unusual in houses of this character. The second floor is trimmed with cypress, and it contains three bedrooms, large alcove, good closets, and a good-sized bathroom; the latter is provided with a Standard Manufacturing Company porcelain lined bath-tub, J. L. Mott's decorated oval bowl, and siphon jet closet, and all provided with exposed nickelplated plumbing. The third floor contains three bedrooms and ample storage room. The house is plastered with King's Windsor cement. A cemented cellar contains a Thatcher furnace and other necessary apartments. Approximate cost at present market value of labor and materials is $4,500, complete. Mr. Benjamin Driesler, architect, 1432 Flatbush Avenue, Brooklyn, N. Y. The gas fixtures were furnished by the Vossburg Manufacturing Company, hardware by Sargent & Co., of New York, and glass by the Pittsburg Glass Company. We intend to publish from time to time, in the future issues of this magazine, similar designs for suburban houses.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A BUNGALOW RESIDENCE AT FOREST HILLS, NEWARK, N. J.

THE engraving presented on page 88 illustrates a residence erected for William W. Bingham, Esq., at Forest Hills, Newark, N. J. The design shown is of a unique character, and the treatment is of the bungalow style. It has many excellent interior and exterior features, including a well shaded and spacious piazza across the front. The underpinning is built of brick laid up in red mortar. The superstructure is covered with sheathing, paper, and then covered with cedar shingles, and left to weather finish a natural silvery gray color. The trimmings are painted cream white. The roof is also covered with shingles. Blinds painted bottle green. Dimensions: Front, 45 ft.; side, 31 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior plans are unique, and it is trimmed with cypress and white pine. The wide reception hall has at the rear end a quaint old-fashioned staircase, with spiral scrolls on rail at foot. The parlor is treated in cream white. The parlor and library have open fireplaces, trimmed with tiled hearths and facings, and mantels made from special designs. The dining-room has a false fireplace, with similar trimmings, and a china closet in opposite corner. The butler's pantry is conveniently located beneath stairway, with the usual necessary appointments. The kitchen, laundry, and pantries are wainscoted, and are furnished with all the best modern conveniences. The second floor contains five bedrooms, six large closets, and bathroom, the latter wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains the servant quarters and ample storage. A cemented cellar contains furnace for hot-water heating, and other necessary apartments. Cost, $5,000, complete. Mr. Charles P. Baldwin, architect, Prudential Building, Newark, N. J.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

THE NEW PROVIDENCE PUBLIC LIBRARY, AT PROVIDENCE, R. I.

We present herewith, on pages 90 and 91, in this issue, illustrations of the new Public Library building, which has recently been erected at Providence, R. I. The building, while of practical construction, is very handsomely designed, presenting much merit in its detail, which has been given a great deal of study, and the whole reflects much credit upon its architects, Messrs. Stone, Carpenter, and Willson, who were selected from a competition of local architects. They have, in co-operation with the librarian, Mr. William E. Foster, devoted their time to every detail of its design and construction. The building is treated purely in the Italian Renaissance style of architecture, and is a very excellent example of that particular style. The basement story of the building is built of Westerly granite, with a superstructure two stories high and constructed of light Roman brick, with dressed Bedford limestone trimmings; the whole being surmounted by a copper roof and large skylights of copper and wire glass to light the stack-room and the upper stories of the building. The entire structure is of masonry and steel, protected by masonry with partitions of steel and plaster, architraves and inside finish of plaster where they are not of marble. The approach to the building is by two flights of gracefully curved granite steps and broad granite platforms. The grounds are enclosed by heavy granite terrace walls, surmounted by a balustrade of granite, with heavy paneled pedestals and turned balusters, all of which has been cut in the best manner by the Rhode Island Granite Company, of Westerly, R. I. The grounds within the enclosure have been laid out by the architects with undulating contours, etc. The entrance is into an oval-shaped vestibule, with walls of white marble and floor of mosaic, beyond which the hall, containing a grand staircase, is located. Opening from the hall is the rotunda, containing the registration and information bureaus and passenger elevator. To the right of the rotunda is the periodical-room, 41 x 50 feet in dimensions, and at the left the reference-room. At the rear there is a large delivery-room, alcoves for catalogues, etc., beyond which is the second stack-room, there being one in the basement underneath this floor, and four above, all of which are in direct communication with the other by book elevator and staircase. The walls of this stack-room are lined with white marble, the floors of which are of glass and iron, the shelves of enameled steel, the window frames of cast iron, and the doors of steel, so that there is nothing combustible in it except furniture. The second floor contains a lecture-room, children's reading and class rooms, trustees' room, auditor and librarian's rooms, and also the Barnard Club room and the woman's staff, lavatory, and locker rooms. The third floor contains the patent, medical, and special libraries, and rooms for special study. The main building has in it nothing combustible, outside of the furniture and books, except the doors and door frames, the window frames and sash, and the single wooden floor laid over concrete and corticene. The fires are confined to the boiler-house, which is apart from the building, nearly underground, the steam-pipes for heating being carried from the same to the building in an underground tunnel. The building is heated principally by warm air forced into the several rooms through warm-air registers in each room by a double inlet fan six feet in diameter, driven by a 12-horse power electric motor, and the foul air is taken from the building by one exhaust fan 5½ feet in diameter and an extra one 3 feet in diameter, the former being driven by an 8-horse power and the latter by a 3-horse power electric motor. In addition to the above, there is a small exhaust fan connected with the dust shaft, the books being dusted by brushing them and beating them over a hopper connected with the exhaust fan, the dust being drawn off the hopper and discharged into the open air above the roof of the building. The heating and ventilating of the building has been arranged by Prof. S. Homer Woodbridge, of the Massachusetts Institute of Technology, working in co-operation with the architects. The book lifts from the delivery desk to the different stack stories are run by electricity, each lift having its independent electric motor, of which there are six. The building is lighted throughout by electricity. The electric power to the motors which run the fans and the book lifts, and for lighting, is furnished at 235 volts by the Narragansett Electric Lighting Company, through their underground conduit system, this being the first building to avail itself of their new system. In addition to the above, the electric work includes eighteen telephone stations, each one of which can communicate with every other station in the building by means of an internal system of telephones; there is also a system of electric clocks, controlled by a regulator clock, which is placed in the children's room. All of the wiring for the electric work is run in metal conduits under the floors and behind the plastering, and is so arranged that, should there be any derangement of the wiring, any wire can be drawn out and a new wire drawn in to supply its place, and most of the lights in the building are controlled by electric switches. The furnishing of the building, with the exception of the chairs and roller-top desks, has all been made from special designs of the architects by the Household Sewing Machine Company, of Providence, R. I., and the whole is most excellent for its simplicity and neatness in design and the excellence of its execution. All the floors which are not of mosaic are covered with Corticene, a new floor covering made in Scotland, which softens the tread so as to entirely deaden the tramping over same. The books in the stack-room are placed upon adjustable metallic book shelves, with floors of iron and glass, all of which have been specially designed for this building and erected by the Fenton Metallic Manufacturing Company, of Jamestown, N. Y., and the book-lifts which connect the various stack stories with the delivery desks have been put in by the Elextron Manufacturing Company. The artificial lighting has necessitated a great deal of study to accomplish the great variety of ends sought. In the stack-rooms the main aisles are lighted by lamps controlled by one set of switches, and the side aisles by two placed at the end of each row of shelves, the upper lighting the overhead lamps and the lower

lighting those in the story below, which, shining up through the glass floor, give enough added illumination. The periodical, music, and bookcases, the book-lift, the lecture-room, the tables in the children's reading-room and in the reference-room, have required fixtures of special design, which have been made by John R. Shirley & Sons, of Providence, R. I., who also made the lanterns at the front entrance from special designs by the architects. The chandeliers and brackets have been furnished by R. Hollings & Co., Shreve, Crump & Son, of Boston, Mass., and Bradley Hubbard Manufacturing Company, of Meriden, Conn. The general contractor was The J. W. Bishop Company, of Providence, R. I. The other contractors were: P. & J. Tierney, Providence, R. I., plumbing; Huey Brothers, heating apparatus; Lord Electric Company, electric work; Library Bureau, card catalogues, cases, and label-holders; Charles E. Hall & Co., marble work, all of Boston, Mass.; Ham & Richardson, Worcester, Mass., telephone equipments; Standard Electric Time Company, Waterbury, Conn., clocks; Barker, Chadsey & Co., hardware, and David Benton, gas-piping, both of Providence, R. I. Messrs. Stone, Carpenter, and Willson, architects, 49 Westminster Street, Providence, R. I.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A COLONIAL DWELLING AT UPPER MONTCLAIR, N. J.

We present herewith, on page 92, in this issue, a modern dwelling of Colonial treatment, which has been recently erected for Mr. F. H. Van Dyke, at Upper Montclair, N. J. The engravings present a design with good lines, good proportions, and a plan well arranged and finished off in a complete manner. The underpinning is built of rough red sandstone, laid up at random. The framework above is covered with clapboarding and painted Colonial gray, with white trimmings. The roof is covered with shingles and finished natural. Dimensions: Front, 36 ft.; side, 29 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. The interior arrangement is complete. It is planned with a central hall, with rooms on either side. The interior is trimmed throughout with cypress and finished natural. The hall contains an ornamental staircase, with newel posts, balusters, and rail turned out of quartered oak. The parlor and library are separated from hall by an archway, with spindle transoms. The parlor is provided with a bay window and paneled seats, and an open fireplace, furnished with tiled facings and hearth, and mantel of excellent design. The library is provided with bookcases built in. The dining-room is an attractive apartment, is octagonal in shape, and is provided with a paneled wainscoting four feet in height. The butler's pantry is fitted up with dressers, cupboards, drawers, etc. The kitchen is provided with sink, a Newport range, and all the best modern conveniences. The second floor contains a large open hall, four bedrooms, large closets, and bathroom, the latter furnished with a Standard porcelain lined tub, and all necessary fixtures, with exposed nickelplated plumbing. The third floor contains ample storage room; several rooms could be finished off if desired. A cemented cellar contains a Thatcher furnace, laundry, and other necessary apartments. The first and second stories have double floors, the top layer being of hard pine finished with hard oil. Cost, $4,300, complete, including everything ready for occupancy. Mr. Christopher Myers, architect, 361 Broadway, New York city, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A MODERN DWELLING AT NEW UTRECHT, BOROUGH OF BROOKLYN, N. Y.

We illustrate on page 93, in this issue, a modern dwelling, which has been erected for the New York and Long Island Realty Company, at New Utrecht, Borough of Brooklyn, N. Y. The engravings present a design treated in the gambrel roof style, with Colonial detail, and it has several good features, including the piazza and porch, and a roof with dormer windows. The underpinning is built of rock-faced bluestone, pointed in black mortar. The building is sheathed and papered. The first story is covered with clapboards and painted a dull red, with white trimmings. The second and third stories are covered with shingles and stained in harmony with the first story. The roof is covered with shingles and finished natural. Dimensions: Front, 43 ft. 6 in.; side, 26 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with cypress. The hall is a central one, and it contains an ornamental staircase, with newel, posts, and balusters. The parlor and alcove, which is used as a music-room, is treated in cherry. The dining-room is stained and finished similar, and it has an open fireplace, trimmed with a tiled hearth and facings, and mantel. The butler's pantry is a large one, and is well fitted up with drawers, shelves, and cupboards. The kitchen and its apartments are wainscoted and furnished with sink, wash trays, range in fireplace, and two large pantries. The second floor contains four bedrooms and bathroom. The latter is wainscoted and furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor contains one bedroom and trunk-room. A cemented cellar under building contains furnace and other necessary apartments. Cost, $2,900, complete. Mr. Gardner Abbott, architect, 123 East Twenty-third Street, New York.

Our engravings were made directly from photographs of the building, taken specially for the Scientific American.

AN ELIZABETHAN RESIDENCE AT ERWIN PARK, MONTCLAIR, N. J.

We present herewith, on page 94, in this issue, a residence which has recently been completed for the Harrison Corporation Company, at Erwin Park, Montclair, N. J. The building is treated in the Elizabethan style of architecture, and it has unusual fine lines and good detail, together with many attractive features, including a cluster columned porch, spacious piazza, porte-cochère, with pointed gabled roof, oriel bay window, with latticed effects, etc. It is worthy of note that there are seventeen gables in the roof of this house. The chimneys are attractive features in themselves, and are built of red brick laid up in red mortar. The underpinning is also built of red brick laid up in red mortar. The superstructure is of wood, and the exterior framework is covered with sheathing and paper, while the whole building is covered with shingles and stained a French red. The trimmings are painted white of a light cream color. The blinds are painted same as trim. The roof is covered with shingles and left to finish a natural silvery gray color. Dimensions: Front, 65 ft.; side, 35 ft., not including piazza and porte-cochère. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The entrance is through a door, with casing of quaint design, into a vestibule with a paneled wainscoting and tiled floor, all treated in china white. The grand central hall is trimmed with white pine, and is treated in china white. It has a paneled wainscoting and ceiling beams, paneled seat, and a broad staircase of attractive design, with treads and balusters treated with china white, while the newel posts and rail are of mahogany. The parlor and library are treated in china white. Each contains a bay window with paneled seat, fireplace, with white enamel tiled hearth and facings, and a mantel of dainty design and in keeping with the apartment; the latter is also provided with bookcases built in on either side of fireplace. The bicycle-room, with its private entrance and opening from the rear of main hall, is a convenience. The dining-room is trimmed with antique oak, and is provided with paneled wainscoting, ceiling beams, and a bay window with paneled seat. The open fireplace is furnished with tiled facings and hearth, and a mantel with columns. The case of drawers, with cupboards over same, is a convenient feature of the passageway from hall into kitchen. The butler's pantry, of large dimensions, contains dresser, drawers, sink, and a private stairway from cellar to third floor. The kitchen is practically isolated from the main house by the three doors which have to be passed in going to hall or dining-room. This kitchen is provided with a Richardson & Boynton range, dresser, sink, and a refrigerator room on rear porch. The second floor contains five large bedrooms, six closets, linen closet, servant's slop closet, and two bathrooms, the latter provided with Standard porcelain lined bath-tub, Ronalds & Johnson fixtures and exposed nickelplated plumbing. The third floor contains five bedrooms and bathroom. A cemented cellar contains laundry, Richardson & Boynton furnace, and other apartments. Messrs. McIllvaine & Tucker, architects, 19 Liberty Street, New York.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

Gardening from an Architectural Point of View.

The last few years may be said to have been, in this country, the epoch of the revival of the interest in gardening as a form of artistic invention, more especially in connection with and in relation to dwelling-houses. The number of books on the subject is one outward indication of this. The mere landscape gardener, with his sham rivers and bridges, his sinuous walks, his picturesquely arranged clumps of trees, and his artificial landslips and geological features, has had his day. Mr. Milner's book, reviewed in our columns a few years ago, was an attempt to reaffirm the landscape gardener, which met with little sympathy or encouragement as far as the author's notions of garden design were concerned, though it contains valuable information in regard to the purely gardening work of selecting and planting trees and shrubs. Since then two well-known architects, Mr. Blomfield and the late J. D. Sedding, produced books on the subject, thus asserting the architect's claim to interpose; and Mr. Mawson, the author of the latest important work on garden-making,* calls himself on the title-page "garden architect;" a title in itself significant of the change of public attitude on the subject. The "landscape gardener," in short, though still existing, has become obsolete.

Mr. Mawson, whose book is far in advance of anything produced by professed garden artists since Repton, draws a broad and very good distinction, in his introductory chapter, between the old and the modern or recent school of garden-makers; the older men, before the days of Brown, were idealists, engaged in creating something of their own; Brown and his followers were realists, considering a garden only as a contrived imitation of the irregularity of Nature. Repton, however, must not be classed precisely with these; he was a man of genius, and though he did not escape the mistakes of the school, he was far beyond any of them in artistic perception and in grasp of his subject, and his great book will always be worth study.

As Mr. Mawson rightly points out, Sedding's observation, "A garden is man's report of earth at her best," however charming in a literary sense, does not quite express the main point or include the whole truth. A garden may be what Sedding called it, but it should be something more; it should be a creation by man out of materials furnished by Nature. That is the true condition of an idealist's garden.

The process of laying out a garden on new ground is well illustrated by the author, in his chapter on "Choice of a Site and its Treatment," by taking an actual site in its main features from the ordnance map, only slightly altering it to avoid identification, and going through the gradual process of placing the house and garden on it, commencing with considering the site in regard to larger features which can not be much altered—contour of land, position of woods, etc., and consequent on these the various lines of vista from the house, which will partly determine its situation and orientation. Having considered the main features of the site, the next thing is to consider the plan of the house and of the accessory buildings; "and herein," the author observes, "lies a great difficulty with which the garden designer has to contend; for directly he begins to inquire into the planning and arrangement of the house the architect looks upon him with suspicion, or his client thinks he is endeavoring to enlarge the scope of his work beyond the area in respect to which he consulted him." This latter may be true; clients are strange creatures. But surely there are very few architects who, if the garden designer asked for a plan of the house before laying out the garden, would not say that he showed his good sense in doing so. A block plan is not sufficient, for the position of the windows of the principal rooms, and of the entrances to the various quarters of the house, must or ought to influence the design of the garden. The more probable point of dispute between the house architect and the "garden architect" (since the author adopts that term) would be, in the present day, that the house architect would himself wish to have a hand in the designing of the portions of the garden immediately adjoining the house; and he has a claim to this too, since the effect of his building must depend a good deal upon the treatment of these immediate surroundings. In fact, we should say that the garden architect should, as far as the immediate surroundings of the house are concerned, work under the house architect and have to satisfy him; but we fear this view will not suit Mr. Mawson. They ought at all events, however, to work in collaboration.

The imaginary house on this estate is given in detail. The manner in which the stable court is connected with the circular carriage court before the main porch of the house is very good, as it preserves the dignity of appearance of the carriage court by keeping a symmetrically disposed exit and entry; but this part of the treatment is very much simplified by the fact that dining-room, drawing-room, and morning-room are all placed facing the same way (S.S.E.) on the opposite side of the house to the entrance court. They are obviously placed for the *prospect*, and that is what a garden architect always thinks of; whereas an architect considers, or ought to consider, *aspect* as well, which is fully as important, if it be not even the more important of the two. In working out the further extent of the garden after leaving the immediate vicinity of the house, the author thinks the best plan is to work outward from the house; studying the sectional lines of the land, and arranging the terraces and gardens so as to preserve some indication of the original lie of the ground. In the plan showing the estate more at large with the house on a small scale, there is an irregularly shaped lake, and the plantations which nearly surround it are traversed by that kind of artificially winding walk which is the special invention of the landscape gardener, and which seems to us to have no connection with the functions of a "garden architect;" but the irregularity of lines of lake and walk is cleverly dominated by a straight walk between thick clipped hedges, which starts from a circular parterre with a central fountain near the house, and is terminated on the margin of the lake by a small circular house, with steps round each side of it down to the margin of the lake, which is responded to by another circular erection and a flight of steps on the opposite

* "The Art and Craft of Garden-Making." By Thomas H. Mawson. Garden Architect. London: B. T. Batsford. 1900.

side of the lake. The whole effect is illustrated in the drawing forming the frontispiece. This manner of connecting the irregular portion of the grounds with the house and the formal garden by a formal walk and structures symmetrically placed in regard to each other is an idea capable of many applications, and is worth bearing in mind. As to the irregular lake, the author defends it on the ground that it was not artificially excavated, but is simply a use made of a natural feature of the ground; in other words, there was an irregular depression in the land here, and it is filled up with water. That is a reasonable excuse for the lake; though we confess that we should be more pleased to find a formal and symmetrically planned piece of water at the end of the clipped-hedge walk. It must be admitted, however, that the cost of making it would be very much greater—in fact, except in the case of a client of more than average wealth, would be prohibitive.

The important subject of fencing is very well treated by Mr. Mawson in a chapter specially devoted to it. While, of course, not adopting the old craze about invisible fences, which gave rise first to the "ha-ha" and then to the wire fence, the author suggests that a medium course may be found in the adoption of fences with intermittent piers or solids between which wires can be strained, so as to give some character to the fence and render it important in the garden design. The same object can also be attained by open wooden railing between widely spaced stone piers. Two or three sketches given of this kind of fence are excellent as suggestions, and look as if they came from the hand of the well-known architectural artist who has drawn the principal plates. The suggestions for garden gates are also good; but the larger iron gates on page 27 are very poor, as the detail sketch more emphatically shows, the main fault being realistic foliage—a fault worst of all in a garden gate, where it has to compete with real foliage. But the author is quite right in endeavoring to suggest, as he puts it, that owners of gardens should give their attention to the formation of a form of fence which would be an improvement rather than a detriment, "instead of concluding that everything that can be done is shown in the hurdle-maker's catalogue." The wire fence may have its commercial value on a farm, as a fence which does not interfere with supervision and does not shut out sunshine from growing stuff; but in connection with gardens or pleasure grounds of any kind it is one of the most unpicturesque and depoetizing divisions of land ever invented.

The cognate subject of hedges is treated in another portion of the book. The author, we are glad to say, does not advocate the fantastic hedge-clipping of older days, but gives the sensible advice that simple forms are the best, not only because they serve their purpose without show or pretense, but also for the practical reason that "they are much more likely to be kept in good form than those requiring great skill in clipping." Some simple and broad forms of varied outline may, however, be used without this drawback. All imitations of natural or artificial objects in cut hedgerows are poor taste and out of place, however they may be archæologically interesting when found in ancient gardens.

A country house presupposes carriages and their means of access. It may be true that the time-honored "loop" shape into which the majority of drives expand at the house entrance follows the lines which a carriage would naturally take in coming up to and turning away from the door, but it is a wretched, ugly way of laying out the lines of the ground, and we prefer either to see a complete circle or semicircle drive, geometrically laid out, or a "carriage court" large enough for turning about without following the lines of a border. The question of single or double lodges at the gate is one of state and importance mainly. There should, in fact, be no duplicate lodges; a cottage on each side of the entrance gates, when the only object is to provide an abode for the gatekeeper, is absurd; it is so palpable that the second one is added merely to balance the other. For a house and estate of average size and importance a single lodge, adjoining the gate, is a sufficient and suitable provision; a second one serves no practical purpose. For a large mansion, a state house, the most suitable and effective form of lodge is a larger and more formal building with an arched entrance through it, the two sides being connected by the story over the arch. Such a lodge is one house, and is both more dignified and more practical than a duplicate. It affords, moreover, much of suggestion to the architectural designer.

Let not the owner of a flat site despair of a good garden. The treatment will be different from that suggested by an undulating or sloping section of land, but it may be almost equally effective in its own way. What were the natural capabilities of Versailles? Level lawns and parterres and water have still their effect, even when there are no declivities to afford the opportunity for terraces on different levels. A beautifully kept, clean-shaven lawn, as the author observes, is one of the greatest charms of an English garden; and in regard to it he gives a useful piece of practical advice:

"A lawn, like a meadow, requires to be in good heart, and must, therefore, be prepared with a sufficient quantity of good soil. To prevent worms, however, a layer of sharp, clean ashes or coke breeze may be laid under the turf, or, where the lawn is to be sown down, under the top spit of soil. Another error is that of neglecting proper drainage. This is the most important factor in the maintenance of good turf, because if the ground retains too much moisture the grass soon grows yellow and is really apt to burn up sooner than well-drained ground. This is explained by the fact that in wet ground the roots are near the surface, while on dry, warm soils they go down deep."

It is seldom, indeed, that we see the most made of the opportunities afforded in the construction of summer-houses and bridges in a garden or park, of designing something entirely with an eye to beauty, and to its relation to the surroundings of lawns, foliage, and water. What are called summer-houses rarely rise above the commonplace in architectural character; and they frequently fall below it, from a mistaken notion that, being in the midst of foliage, they should be treated in a kind of naturalistic or "rustic" manner, with the idea of harmonizing with their surroundings, whereas they should contrast with their surroundings. A summer-house should be a little bit of refined artificial design introduced amid the work of Nature. A mere arbor is another thing—that is not architecture; but a summer-house should be architectural. The examples given in the book before us are not much better than usual; but the author is on the right track in regard to these things, especially in condemning those foolish things called rustic bridges, which, as he says, are not only a mistake in point of taste, but, owing to the insufficient way in which they are almost necessarily put together, are constantly requiring repair. We may add that where over a deep stream or a waterfall they may be a source of danger from the unsuspecting visitor leaning against the "rustic" parapet when it is not in a state to resist pressure. A good example is given on page 65 of an oak bridge which, while soundly constructed, is quite in keeping with an out-of-the-way and informal corner. We are also entirely in accordance with Mr. Mawson in his remark as to the unsatisfactory style of most "catalogue" garden seats, though whether the village carpenter of the present day would produce anything better, as the author suggests, may be doubtful; what is called (and sometimes miscalled) education has penetrated everywhere so much that probably the village carpenter himself will think it his duty to do something consciously "ornamental" for a garden seat. Mr. White, of Bedford, with the assistance of one or two architects, has started something more to the purpose in the way of garden seats, and we should think that the one shown in Mr. Mallow's pretty sketch of "circular garden seat and lead figure," on page 69 of the book, came from that quarter.

On the important question of the treatment of water we find that in regard to miniature lakes the author does recommend architecturally treated and formal ponds rather than quasi-natural ones; but he does not seem quite to recognize that the principle is just as good when you come to recognize that the principle is just as good when you come to artificial water on a larger scale, and that it is really only cost that should stand in the way. If a lake is to be artificially formed without making it part of a formal design, he is certainly quite right in recommending that it should be done by merely flooding a natural depression of the ground, without making artificial capes and bays on a small scale. But even this can only be called a makeshift. The only natural water worth having in a park is a real lake on a large scale, pre-existent and merely taken into the boundary. The author gives a plan of Wolverhampton House and grounds, where the house stands centrally at the head of a piece of ground 1,000 feet wide and 1,500 feet long, bounded by straight avenues sweeping round in a true semicircle at the end opposite where the house is placed. Except the formal garden immediately fronting the house, this space is occupied by an irregular wilderness treatment, with artificially winding walks (not geometrically laid out), and what is euphuistically called a "lake," formed by filling in an irregular depression (partly consisting of spoil banks) with water. But on apylying the scale we find this "lake" is 500 feet long and averages 100 feet wide. What is the use of calling a thing like that a "lake"? Treated as a formal piece of water, it would have been large enough for effect; as a quasi-natural lake it is futile. And what an opportunity—what an actual suggestion—is offered for a stately symmetrical laying out of the ground, by the mere shape of the bounding avenue with its great semicircle, axial with the house at the upper end! We should call this a great opportunity thrown away. At all events, let us not hear a straggling pond 500 feet long called a "lake"; it is a misapplication of terms. Nothing under a mile long by half a mile wide can be called and treated as a lake—and that is but a small one. Such attempts at irregular lake scenery on a diminutive scale only make one melancholy.

We recommend to the attention of the owners of estates Mr. Mawson's plea for a greater recognition of the kitchen garden as an element in the scheme of the grounds and a place worth penetrating into for other purposes than to cut cabbages for the table, and therefore not to be entirely divorced and rendered inaccessible from the professedly ornamental grounds. A kitchen garden has a beauty of its own, different from that of the flower garden and lawn; not to speak of the pleasure, in its season, of eating fruit straight off the trees, which the author seems to pass over as frivolous. There is much sense, too, in his treatment of that architectural bugbear the conservatory, which, however pleasant a retreat it may be internally, spoils the exterior of many a fine house, hanging on it as a kind of parasite. It is gratifying to find that a writer who can speak with authority as a gardener is of opinion that the sheets of plateglass and the attenuated architectural features which characterized the ordinary modern conservatory are not even practically necessary. As he points out, a conservatory is really more for displaying plants than for growing them, and has to be more or less dependent upon the purely utilitarian supplementary plant-houses, which need not be thrust into view. As long as the conservatory is accepted as a department of the dwelling-house, and grouped with it, it should be designed to harmonize with it architecturally. Some architects, as we have had occasion to notice, have recently made a decided move in this direction; we hope others will follow their example.

We fear that the whole subject of "Planning for Landscape Effect," to which a separate chapter is devoted, is to our minds fraught with unreality and pretense, and it is only, in fact, in this chapter that the author seems to fall into some of the cant of the landscape gardener, though by no means to the extent that we have met with in books specially professing that unlawful art. Nor do we agree with the remark in the chapter on "Forest Trees and Hedges," that the radiating avenue is "very rarely justified by results." We should be inclined to say that it is one of those devices which, when carried out on a large scale, can not fail to produce a fine effect. Of course, it must be remembered that an avenue is only in place at all when the condition and importance of the house are such that stateliness in its surroundings is natural and justifiable. An avenue leading up to a second-class house becomes a vulgarity.

Mr. Mawson's book contains a great amount of practical gardening information in regard to trees and shrubs, and the treatment of soil, etc., on which we have not touched, as we are considering the subject from the point of view of effect. But owners or prospective owners of estates to lay out will find the book of much practical value, and the generally sound views of the author in regard to the architectural treatment of gardens may be very useful, from the point of view of the architect, in the education of the client. Architects themselves may not learn much from the book, but they will be glad to welcome a gardener whose views on many points will be in harmony with their own. We may add that the illustrations to the book, drawn by Mr. Mallows "and others," are admirably done; and the volume generally is, in a decorative sense, worthy of its subject.—The Builder.

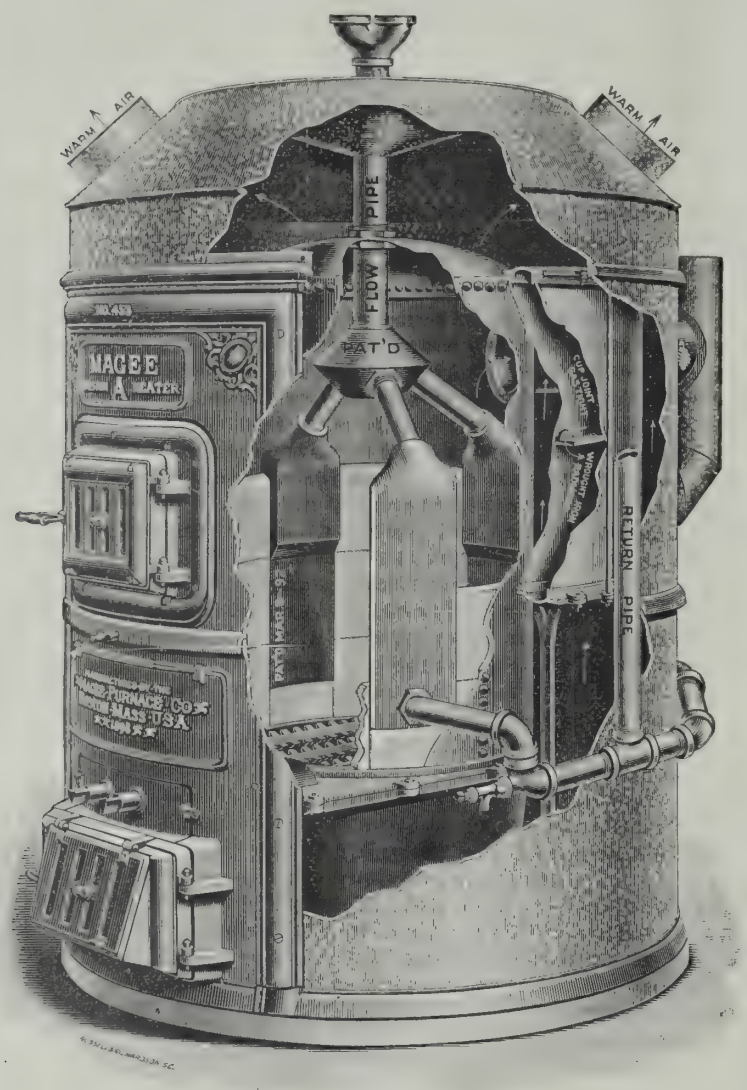
Ventilation of Cellars.

THE object of ventilation is to keep the cellars cool and dry, but this object often fails of being accomplished by a common mistake, and instead the cellar is made both warm and damp. A cool place should never be ventilated, unless the air admitted is cooler than the air within, or is at least as cool as that or a very little warmer. The warmer the air the more moisture it holds in suspension. Necessarily, the cooler the air the more this moisture is condensed and precipitated. When a cool cellar is aired on a warm day, the entering air, being in motion, appears cool; but as it fills the cellar the cooler air with which it becomes mixed chills it, the moisture is condensed, and dew is deposited on the cold walls and may often be seen running down them in streams. Then the cellar is damp and soon becomes moldy. To avoid this the windows should only be opened at night, and late, the last thing before retiring. There is no need to feel that the night air is unhealthful—it is pure as the air of midday, and is really drier. The cool air enters the apartment during the night and circulates through it. The windows should be closed before sunrise in the morning and kept closed during the day. If the air of a cellar is damp, it may be thoroughly dried by placing in it a peck of fresh lime in an open box.—American Agriculturist.

THE TRUST MOVEMENT.—The New York Journal of Commerce has compiled a series of interesting statistics illustrating the progress of the trust movement in this country. The figures presented, which are claimed to have been compiled with great conservatism, show that during the forty years beginning with 1860 the aggregate capitalization of the industrial consolidations actually incorporated exceeded the enormous total of $4,000,000,000. Of these, the incorporations in the iron and steel trade easily beat all other industrial classes in amount, the aggregate capitalization of consolidations in that industry being shown to have reached a total of over $853,000,000.—Metal Worker.

THE MAGEE BOSTON HEATER.

THOSE who are in favor of heating by warm-air heaters can find in the Magee system a well demonstrated means of warming and ventilating any sized house, hall, or church. If these structures are built so that it is difficult or impossible to succeed with warm air alone, then auxiliary heat can be carried to remote and exposed parts without being affected by the pressure of the wind or the length and crookedness of the pipes. This supplementary heat, of the "hot water combination," is a most perfect auxiliary. It can be readily applied to the Boston heater, either before or after it has been set up. It entirely obviates the objections raised against the use of the warm-air furnace if it is of a superior grade. And if this kind is of the right size and properly put up, it is not necessary in a single instance to superheat or vitiate the air in the slightest degree. It is well known that in order to keep a house comfortable in zero weather by a warm-air furnace, it is necessary to raise the temperature of the air from zero to over a hundred degrees while it is passing over the radiating surface. To do this it is not necessary to have a heater whose radiating surface is red-hot in order to get the needed heat in the rooms above. On the contrary, it should be so made as to prevent this. This furnace is of sufficient size to admit, provide for, and heat a relatively larger quantity of air at a lower temperature, and with it it is impossible, under proper management, to superheat the air. The warm-air furnace is simple in construction, avoiding all unnecessary joints and complex flues. Absolutely gas and dust tight connections, designed to bring the products of combustion into contact with the largest area of direct and intensely effective heating surface, without impairing the draft, and keeping clear of all connections which are liable to leak gas, dust, and smoke. The radiating surface is composed of wrought iron. It is the refined metal, rolled and compressed until it is a uniform and compact mass, free from pores and defects of any nature. A radiator made of this material, with a dome firmly riveted and steam-tight, is practically indestructible, and is impervious to gases and dust. The heating capacities of the furnaces are from 12,000 to 35,000 cubic feet in frame dwellings exposed on all sides. The company also manufacture the "Wonderful" dock-ash grate, the "Grand" range, and the "Kitchener" range. Their illustrated catalogue fully describes the product of the foundries at Chelsea, Mass. The principal office and warerooms are at 32–38 Union and 19–27 Friend Streets, Boston, Mass.



COMBINATION HEATER.

THE well-known house of Bommer Brothers, of 257–271 Classon Avenue, Brooklyn, N. Y., has been honored by receiving a gold medal at the Paris Exposition. The jurors in this department of the Fair were carefully selected experts, and it is highly creditable to the firm that the award was unanimous. The Bommers have made a life study of spring hinges. They confine their output to this article exclusively, and theirs is conceded to be one of the best spring hinges in the world.

Double Windows.

IN advocating the use of double windows in town and country houses, an English doctor writes to one of our foreign contemporaries as follows:

"The thinness of the walls of our houses, as well as most private and public buildings, being provided only with single windows, are doubtless among the chief reasons conducing to the freezing up of so many water pipes, and their bursting subsequent to the thaw. In my Brighton residence, some 120 feet above the level of the sea, which it faces in a southwesterly direction, I find the foreign plan of having double windows has many advantages.

"1. In winter, by keeping in the heat of the room and excluding cold, double windows diminish the quantity of coal necessary for heating one's rooms.

"2. During fierce storms double windows completely exclude wet and wind.

"3. Double windows greatly deaden the noise attending storms, and frequently prevent one's hearing the cries of itinerant hawkers, as well as the belligerent discord of street music.

"4. Double windows seem often to enable one to put up with the discomfort of having no convenient means of heating, by open fireplaces, hot air or hot water pipes, the staircase of one's house, which, of course, in winter ought to be warmer than the living and sleeping rooms.

"5. During cold weather, on both sides of the panes of single windows, ice is often deposited. Hence in a room which is well warmed, when striking against this cold surface, the heated air is radiated or reflected back into the room in the shape of a sharp, cold draft, which may be injurious to the health of delicate people, especially if seated near the window. However, in the case of double windows, these drafts by radiation are scarcely perceptible, because in a heated room the internal window is warm, particularly if there is a broad space separating the outer from the inner window.

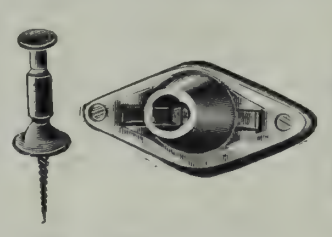
"The back of my house being directly exposed to northerly and northeasterly gales, has enabled me often to observe a difference of 15 to 20 degrees Fahrenheit between the temperature recorded in the inner side of the outer window as compared with the temperature on the room side of the internal window. When I first lived in my present residence, during the winter in passing from the front to the back of the house there was frequently a difference of fifteen or more degrees Fahrenheit, so that one felt as if one were almost entering another climate. However, subsequently being protected by double windows and double skylights throughout the house, as measured from within it, there has been during winter only a very slight difference between its two aspects. Even draining all the cold water pipes at night time in this house, furnished with constant water supply, which has practically no cold water cisterns (except small ones for the lavatories), nevertheless during sharp frosts some of the cold water froze up.

"I presume this experience proves that even double windows will not prevent the freezing of one's cold water pipes in houses where the walls are too thin, as unfortunately is too often the case in our modern jerry-built British houses, usually architectural and artistic abominations."—The National Builder.

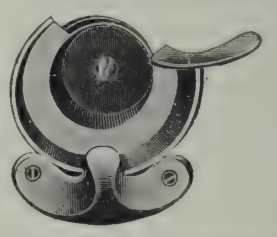
WASTE IN MAKING ARTIFICIAL LIGHT.—Under the best conditions obtaining at present, out of every 100 tons of coal delivered at gas-works or electric-light stations, something like 98 tons are, as far as the production of light is concerned, absolutely wasted and go to produce useless heat. When one considers the enormous quantity of coal used annually for the production of artificial illumination, the absolute waste of 98 per cent. of it seems little short of criminal. Will the problem ever be solved? It must be confessed that at present the prospects are far from being bright. Some means must be found of exciting ether vibrations between the visible limits only, and of eliminating the slow, radiant heat-waves. Whatever method may be eventually employed, it is interesting to note that already, on a small scale, the problem has been solved by the firefly, the most delicate measurements having failed to detect any radiant heat in the light emitted by this little creature. Surely this ought to be an interesting subject for investigation by the physiological chemist, who, working in conjunction with the physicist, might enable us to get nearer the solution of this important question.—Cassier's Magazine.

NOVEL WINDOW CATCHES.

SOME entirely new additions to basement window hardware are now being placed on the market by the Caldwell Manufacturing Company, 8 and 10 Jones Street, Rochester, N. Y. The "Acme" automatic basement window catch here illustrated takes the place of a hook and eye for holding cellar windows open. The sash is pushed up against it and it holds; a quick pull releases it. It is a strong, sure catch, which saves the difficult reaching up to hook the sash. The second cut represents the "Acme" basement window fastener. A strong, secure lock presses the sash tightly into the frame. It takes up the slack, prevents rattling, and excludes cold air and snow when a sash is loosely fitted. It operates in the same manner on attic and dormer windows hinged to swing. The "Acme" basement window set is contained in a box. The set consists of one pair of wrought butts 2½ inches, japanned with screws, one window fastener, and one window catch.



ACME AUTOMATIC BASEMENT WINDOW CATCH.



ACME BASEMENT WINDOW FASTENER.

THE new twenty-story office building which is being erected at the corner of Broad Street and Exchange Place, New York city, and which will be known as the Broad and Exchange, is to be thoroughly up to date in every feature of its construction and furnishing. It will be equipped throughout with the Kenney Flushometer system, manufactured by the Kenney Company, New York, which system has been adopted for this largest of all office buildings on account of its sanitary superiority.

FROM the Keuffel & Esser Company, of 127 Fulton Street, New York city, we have received a new catalogue, which contains complete illustrated descriptions of mathematical and surveying instruments. A catalogue issued by the largest dealers in mathematical instruments deserves more than the passing attention which is usually given to the publications of manufacturers. When a new catalogue is issued by Keuffel & Esser, it may be inferred with more than reasonable certainty that improved apparatus has been added to the stock, and that new instruments have been introduced. In size the catalogue is larger than any of the previous Keuffel & Esser books. Its five hundred pages, as might be expected, contain much additional matter and new cuts, not found in the last edition. The new material includes slide rules and improved planimeters and pantographs (listed in a heretofore unattempted variety), together with an increased assortment of fine steel tapes. Reels are listed separately to permit greater latitude in selecting. The assortment of drawing instruments, scales, drawing-tables, etc., has been enlarged. Profile and cross-section rulings on cloth have been added. The book is not merely a catalogue of the Keuffel & Esser products, but also a complete list of most of the instruments of precision used by scientific men.

A CEDAR EIGHTEEN FEET THICK.—J. R. Young, manager of the Burke Shingle Mill, while cruising out timber, found a cedar tree near the road from South Bend to the Palix River, which he measured and found to be 56 feet in circumference, or about eighteen feet in diameter. It was over seventy-five feet from the ground to the first limb. The most famous and heretofore largest cedar known in the State is near Sedro-Woolley, the stump of which measures 14 feet in diameter. The top of it was smoothed off and used as a dancing platform. Photographs of it, crowded with people craning their necks to get their faces taken, have been scattered widely. This stump really consisted of two trees grown together, but the tree discovered by Mr. Young is a single one, nor is it swell butted.—Seattle Post Intelligencer.

THE trend of prices in the building trades is shown by the following estimates for a ten-story fireproof loft building on a 50 x 100-foot corner plot, taken from the New York Sun:

	January 1898.	January 1899.	August, 1900.
Mason contract	$78,125	$96,875	$87,500
Iron contract	43,750	62,500	50,000
Carpenter contract	15,625	22,500	22,500
Steam heating contract	6,250	8,750	8,125
Plumbing contract	3,125	4,375	3,750
Electric wiring contract	1,875	2,500	2,500
Elevator contract	5,625	6,250	6,250
Caisson contract	7,500	9,375	9,375
Totals	$161,875	$213,125	$190,000

The present cost of fireproof loft construction is about 27 cents per cubic foot, in January it was 30 cents, and a year and a half ago it was 22 cents.

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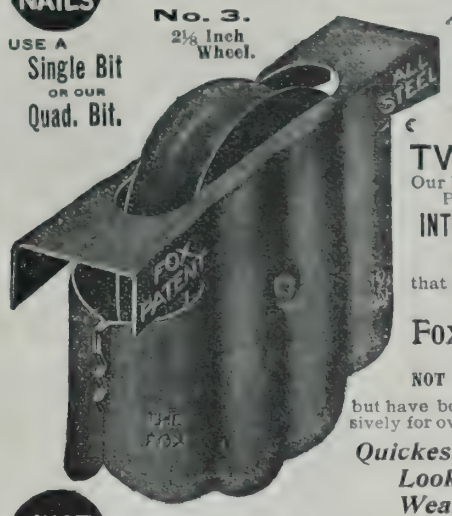

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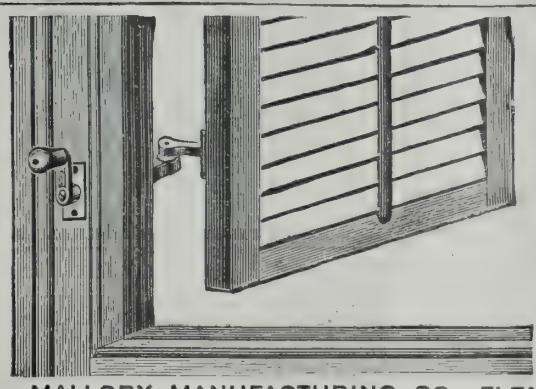

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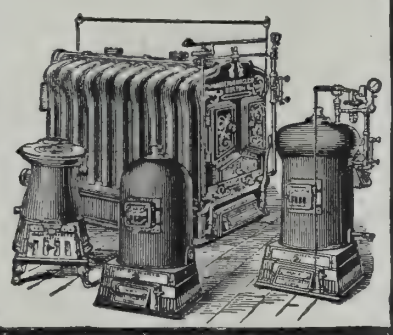

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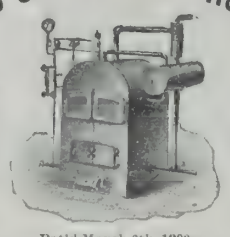

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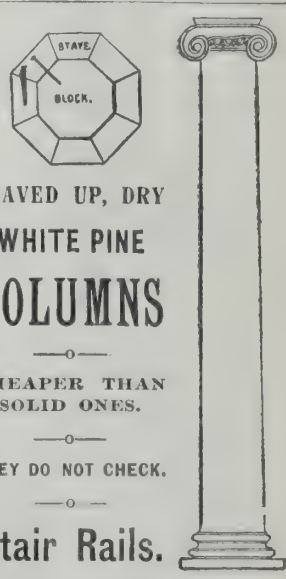

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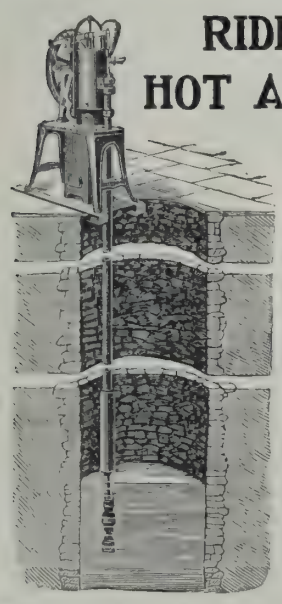

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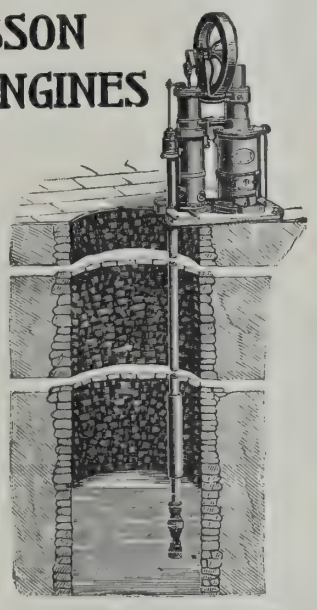

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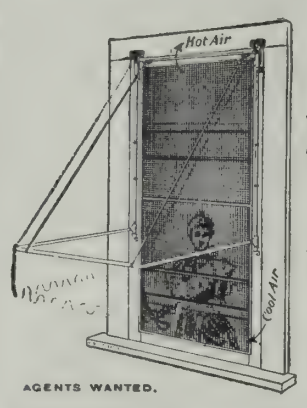

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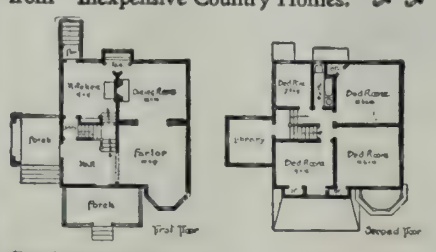

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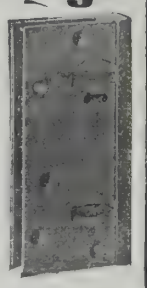

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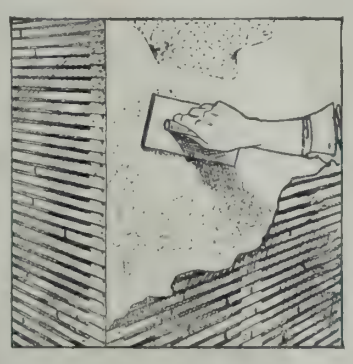

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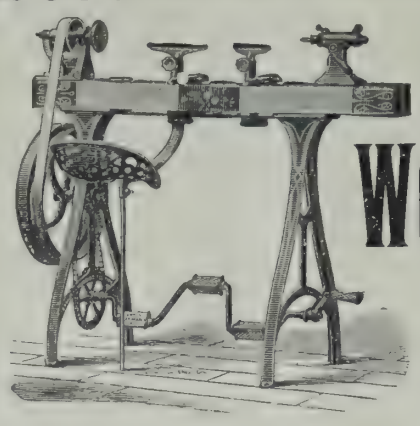

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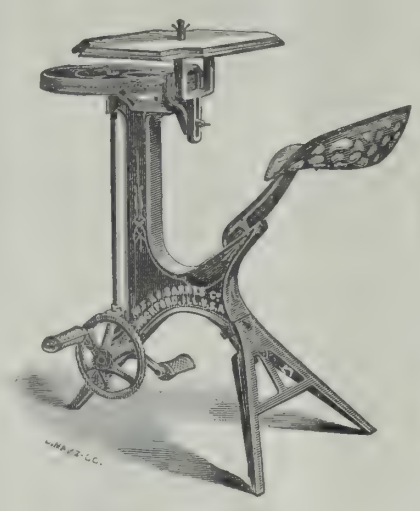

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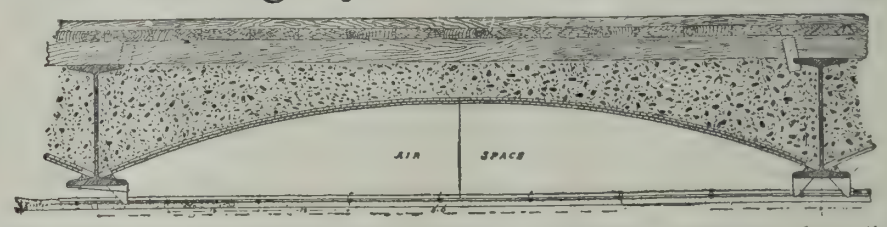

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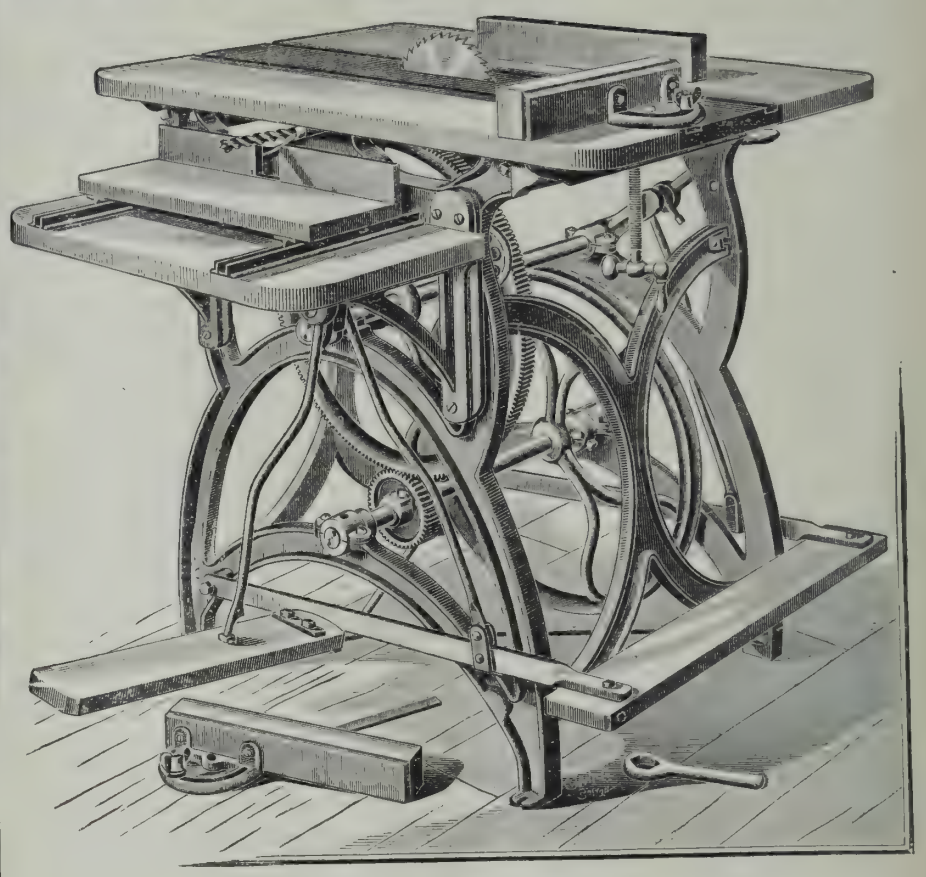

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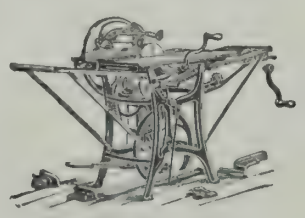
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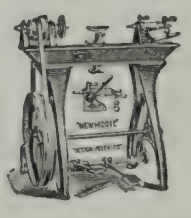
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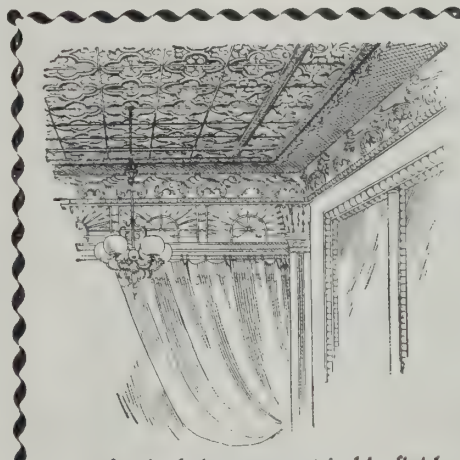

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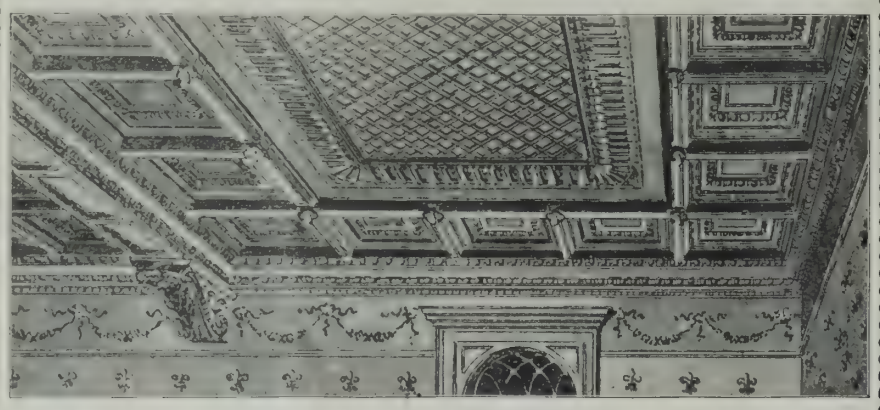

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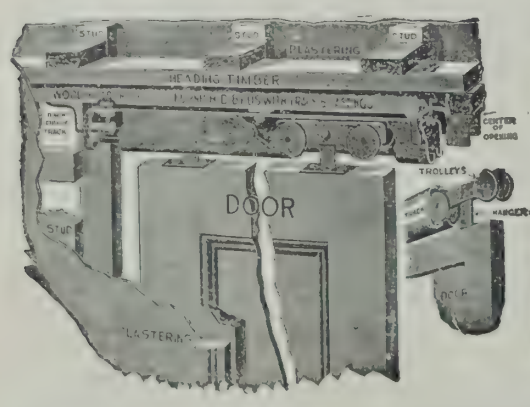

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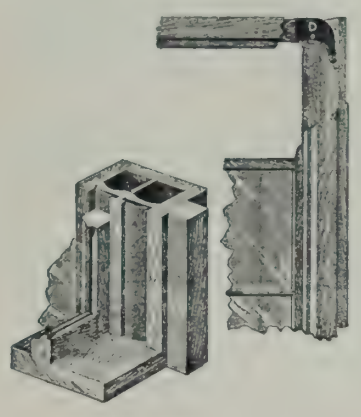

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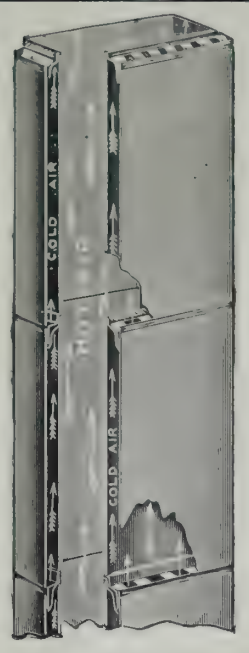

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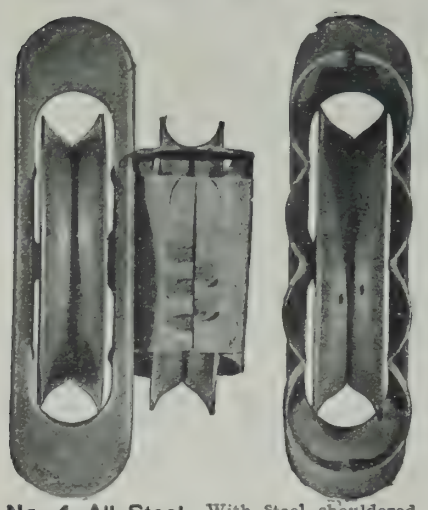

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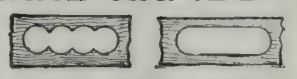

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THE BEACON OF PROGRESS.

THE Paris salon of 1900 has awarded the first medal in the Department of Architecture to Mr. D. Despradelle, who is the Rotch Professor of Architectural Design in the Massachusetts Institute of Technology, for a design for a monument 1,500 feet high to be called "The Beacon of Progress." Since this time the French Government has purchased two of the smaller drawings of this monument, which are to be hung in the Luxembourg, an honor which few architects have ever enjoyed. When Mr. Despradelle first visited the United States in 1893, he went to the Chicago Exposition and was struck by its splendor and by the energy of the people who were capable of developing such an enterprise. It seemed to him that such a manifestation should not be allowed to pass without leaving some trace. This gave him the idea of a monument as a memorial of the Chicago Exposition. He finally designed one of a national character which should symbolize both progress and grandeur, and his design of a column 1,500 feet in height was the result. The studies for the undertaking covered a period of six years, and the amount of labor involved in proportioning the mass was very great. The monument is supposed to be placed in Jackson Park on the site of the World's Fair, facing Lake Michigan. It is to be connected with the principal roads and avenues of the park, the chief access being from the lakeside by a maritime boulevard; an esplanade precedes the access to the principal terraces and platforms from which can be read the different facts in American history, represented by sculpture, bas-relief and by inscriptions. In the place of honor in the axis of the monument are written the names of the thirteen original States, and upon the stela guarded by the eagle is a goddess of the twentieth century, the modern Minerva, flanked by ranks of lions. At the base is a great amphitheatre where orators and others can deliver inspiring words before the altar of their country. In the interior, elevators will give access to the different stories, as well as to the powerful beacon placed 1,500 feet above the ground. In the lake itself, facing the monument on the other side of the esplanade, is to be a basin of vast dimensions for regattas, with seats for 100,000 persons. While the idea is a novel one, it is not expected that any immediate steps will be taken to realize it. The non-success which has attended the raising of funds for the Army and Navy Arch in New York city, shows the extreme difficulty with which money is raised for enterprises of this kind.

A GAMBREL-ROOFED DWELLING AT BRIDGEPORT, CONN.

WE present herewith, on page 105, in this issue, a gambrel-roofed dwelling, which has been recently completed for Hamilton S. Shelton, Esq., at Bridgeport, Conn. The design is admirable, and it has many excellent features—ornamental windows, oriel and bay windows, well shaded piazza, and Colonial detail. The underpinning is built of rock-faced bluestone, laid up ashlar. The superstructure is constructed of wood, while the exterior framework is covered with sheathing and paper. The first story is covered with clapboards, and the second story with shingles; the balustrade at piazza and the gables and roof are also covered with shingles. The clapboards are painted a light gray color, and the shingles are stained with Cabot's shingle stain, a light yellowish gray color. The trimmings are painted a cream white. Dimensions: Front, 33 ft.; side, 45 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft.; third, 8 ft. The interior is trimmed with whitewood throughout, and is finished natural. The hall contains an ornamental staircase turned out with newels, posts, balusters, and rail, and a landing with an oriel bay, thrown out and glazed with leaded stained glass. The parlor and dining-room are separated by double sliding doors, and each have bay windows, while the latter has a china closet. The den is treated in a unique manner, and it has a bay window, and an open fireplace built of brick, and trimmed with American encaustic tile, facings, and hearth, and a wooden mantel of excellent design. The butler's pantry, kitchen, and rear stairway are fitted up complete with all the best modern conveniences. The second floor contains three large bedrooms, six large closets, linen closet, and bathroom, the latter being wainscoted and furnished with a Standard porcelain lined bath-tub, a Douglas closet, and a lavatory, all provided with exposed nickelplated plumbing. The third floor contains one bedroom and ample storage. Extra rooms could be finished off if desired. A cellar, with a Rosendale cement bottom, contains a Thatcher furnace, laundry, and other necessary apartments. The house was built at a low cost, which will be given on application to either the architect or owner. Mr. Charles T. Beardsley, architect, The Bridgeport Savings Bank Building, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A DOORWAY IN A HAMBURG HOUSE.

OPPOSITE is given an idea of what modern German architects are doing in the way of designing details for private houses. It is a main doorway of a house in Hamburg, and was designed by Griseboch und Dinkloge of Berlin. The entrance is spanned by a round-headed arch with a grotesque mask sculptured on the front of the keystone. The lunette is filled with ornamental grille work, and the doors themselves are most substantial. Each valve is divided into three square space, the upper one being divided in three round-headed windows separated by columns. Between the panels there is appropriate carving. The handles and latches are of metal. For our engraving we are indebted to the Blätter für Architektur und Kunsthandwerk. Verlag von Julius Becker, Berlin SW.

A MODERN RESIDENCE AT MOUNT VERNON, N. Y.

WE present herewith, on page 106, in this issue, a modern residence recently completed for D. W. Coon, Esq., at Chester Hill, Mount Vernon, N. Y. The engravings show an admirable house for a suburban residence, and the elevations, though treated in the gambrel roof style, is most attractive and pleasing, with its dormer and bay windows, its piazza designed in the Roman Doric order, all of which go to add the picturesque and beautiful which is desired in a suburban home. The first story is constructed of Vermont marble, white in color, and laid up in broken rock-faced ashlar in one-eighth inch joints. It is a very fine piece of marble work and most satisfactory. The steps and water-table are of dressed Vermont marble. The second and third stories are of wood, with the exterior framework covered with sheathing and paper. The gables and faces to dormer are covered with clapboards in narrow widths, and painted a soft cream color. The roof is covered with shingles, and is stained a dull moss green, harmonizing nicely with the other part of building in its color scheme. Dimensions: Front, 48 ft.; side, 44 ft., not including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior arrangement is most excellent and complete. The hall is a central one, and of good dimensions. It is trimmed with quartered oak, and is entered from the front through a vestibule, trimmed in a similar manner, and provided with a mosaic tiled floor. Both have paneled wainscotings, and the former contains an ornamental staircase, with carved newel posts, balusters, and rail; these stairs rise to a broad landing, from which a bay window is thrown out, making an attractive nook. The parlor is trimmed with mahogany, and it has a circular bay window at front. It contains an open fireplace, trimmed with tiled facings, and hearth, and a mantel of excellent design, with mirror, etc. The library and dining-room are trimmed with quartered oak, and the former contains a circular bay window at front. The dining-room has a paneled wainscoting, and an open fireplace trimmed with tiled facings and hearth, and mantel of oak, with columns and mirror. The butler's pantry is fitted up with cupboards, closets, drawers, and sink complete. The kitchen is furnished with all the best modern conveniences, closets, hearth for range, stairs to cellar and second floor, and lobby large enough to admit ice box. This kitchen and butler's pantry are trimmed with ash. The floors in parlor, library, dining-room, and hall are laid with seven-eighth inch quartered oak parquet floors with mahogany borders. The second floor contains a large hall, five bedrooms, six closets, and bathroom. This floor is trimmed throughout with ash. The bathroom has a tiled wainscoting five feet high, with molded tile cap and sanitary base. The floor is paved with tiles, and the whole is furnished with porcelain fixtures and exposed nickelplated plumbing. The third floor is trimmed with white pine finished in its natural state, and it contains three bedrooms, with lavatory and trunk-room. A cemented cellar contains laundry, a hot-water heater made by the Putnam Foundry and Machine Company, servants' bathroom, storerooms, coal bins, and all necessary apartments. Mr. Frank Marion Wright, architect, "The Fairfax," Mount Vernon, N. Y. The contractor was Mr. Maurice J. Sullivan, of Mount Vernon, N. Y. The mill work was furnished by Willson & Adams, of Mount Vernon, N. Y. The mantels and tiling by A. S. Nichols & Co., of Harlem, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN SUMMER RESIDENCE AT DEAL BEACH, N. J.

WE present herewith, on page 107, in this issue, a modern summer residence, recently completed for the Atlantic Coast Realty Company, at Deal Beach, N. J. The design is treated in the plaster and half-timbered style, with an artistic and pleasing effect. The exterior is beamed, while the spaces between are filled in with plaster. These beams are stained an old brown, and are in harmony with the soft gray color of the plaster panels. The roof, which is shingled, is painted a brilliant red. Dimensions: Front, 65 ft.; side, 30 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior throughout is trimmed with white pine, and is painted ivory white, except kitchen and its apartments, which are finished natural. The hall is a central one, and it contains an ornamental staircase, with newels, posts, and balusters neatly turned, all of which is painted white, except handrail, which is of hardwood. The fireplace is built of buff Roman brick, while the facings and hearths are paved with same, and the whole furnished with a neat wood mantel. The parlor, of good dimensions, is provided with an open fireplace, trimmed with white enameled tile facings and hearth, and a mantel of exquisite design. The dining-room is treated and finished in a similar manner, with fireplace, etc. The kitchen and its apartments are fitted up complete. The kitchen is provided with a Richardson & Boynton range. The second floor contains four large bedrooms, large closets, and two servants' bedrooms, with private stairway to kitchen, thus isolating the servants' apartments from main house. This floor also contains a bathroom, furnished with a Standard porcelain lined bath-tub, and J. L. Mott's fixtures, and exposed nickelplated plumbing. The third floor contains two bedrooms and ample storage. A cemented cellar contains a laundry, a Richardson & Boynton furnace, and other necessary apartments. Mr. James Brown Lord, architect, New York city, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODERN RESIDENCE AT HARTFORD, CONN.

THE engravings, shown on page 112, in this issue, illustrate a modern residence, which has been recently erected for Mr. George Calder, at Hartford, Conn. The lines of the house are square, affording good square rooms on the interior; these lines are well broken by numerous bay windows, piazza, and dormer windows in roof. The underpinning is built of rock-faced bluestone laid up ashlar. The superstructure, of wood, is covered on the exterior framework with sheathing, paper, and shingles, left to finish a butternut brown color. The trimmings are painted ivory white. The roof is shingled and finished similar. Dimensions: Front, 40 ft.; side, 31 ft., not including piazza and rear porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft.; third, 8 ft. The house is well planned, with a central hall, which is trimmed with oak, and it contains an ornamental staircase turned out of oak, with newels, posts, balusters, and rail. The parlor and sitting-room are trimmed with red mahogany, and each has an open fireplace, trimmed with tiled hearth and facings, and mantels of mahogany and of excellent design. The dining-room is trimmed with oak, and it has a large well fitted up butler's pantry, with dresser, closets, and cupboards. The kitchen and its apartments are wainscoted, and are fitted up with the best modern conveniences. The second floor is trimmed with pine, and it contains four bedrooms, furnished with large closets, and a bathroom fitted up complete. The third floor contains ample storage room; several rooms could be finished off if desired. A cemented cellar contains laundry, a Palace Queen furnace, made by Russell Wheeler & Son, Utica, N. Y., and other necessary apartments. Mr. George Calder, 140 Sargent Street, Hartford, Conn., was the architect and builder.

Our engravings were made directly from photographs of the building, taken specially for the SCEINTIFIC AMERICAN.

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SUBSCRIBERS, or others, having copies of the January, 1900, issue of the BUILDING EDITION which they wish to dispose of will please communicate with the publishers, who are desirous of securing additional copies. A reasonable sum will be paid. Address Munn & Co., 361 Broadway, New York.

A SPANISH-AMERICAN HOUSE AT PASADENA, CAL.

WE present as the subject for colors and also on page 104 in this issue, a Spanish-American house, erected for Mr. Frank Emory, at Pasadena, Cal. The artistic home, shown in the accompanying illustration, will suggest to the reader, interested in architecture, that the Californian architect has been more or less influenced by what is known as "Mission Architecture" and has adapted it most happily in the construction of modern houses, producing, what may be termed, a distinctively Californian architecture. Did space permit, it would be a pleasant task to trace back the evolution of this beautiful expression of the designer's art, but it is only necessary to say that the graceful arches, the long colonnades, the interior courts, in all probability originated in Arabia and constitute the main features in what is known to-day as Saracenic architecture. This developed into two branches, one of which is to-day the Arabic in Cairo, the other the Moorish in Spain. No one can glance at the mosque of Tooloon at Cairo, built in 879, without being reminded of the missions in California. Here is the central court, or patio, the long corridors and series of beautiful arches, which constitute a characteristic of the missions of to-day, but it is to the Moors to whom we trace this new art. The fathers who accompanied Cortez to Mexico and established on the Pacific Coast the remarkable chain of missions which extend from La Paz to Monterey, introduced this form of architecture into America. Their ideas were essentially those of the Moors, and most of the missions in North and South America were copied from similar ones in Spain, or were duplicates of buildings already erected in Mexico. The missions of San Luis Rey and Santa Barbara are examples of the most elaborate structures in the United States, and by comparing them with the modern adaptations, it will be seen that the architect has preserved the salient points and produced results which will become the most distinctively American of any architecture yet seen upon the horizon of a particularly barren field—a field that in four hundred years has, excepting the Colonial, produced no really distinctive American architecture, and, indeed, the Colonial is as ancient as the art of the Moors. A casual glance at the Mission of San Luis Rey—founded in 1798 under the auspices of the Marquis of Branciforte—will show the essentials which have been utilized to produce the modern California home. The observer at once notes these two features, the series of arches and the patio, which have been adapted in various ways in these modern dwellings. The patio is perhaps the one feature which is most prominent in the mission architecture, and the famous examples in Southern California, Mexico and South America, are undoubtedly more or less imitations of many found in Andalusia. The most noticeable in Southern California is the patio of the Hotel Coromado, around which are grouped the seven or eight hundred rooms; the enclosure forming a beautiful tropical garden, or patio. The admirable features of the patio in a climate like that of California have been long recognized. It constitutes an outdoor room, an indoor park—filled with verdure-growing palms, making an ideal life possible. In the typical mission house, the patio is first outlined, the house then built around it, each apartment opening on to it; in the center of which is a fountain, while the trees enclosed rustle with the soft breeze, together with the groups of brilliant red cannas, forming effective color schemes. Some one has expressed it, in the patio one is merely taking the lawn into the house, where it can be enjoyed. It is interesting to note in this connection the growth and development of mission architecture in the adobe of the Indian and Mexican. All the old houses of California are of adobe or mud. The walls, which, perhaps, in the missions were made remarkably thick, as in San Luis Rey which were 56 inches, to serve as a fortress against the hostile Indians, had been imitated, and houses in Los Angeles, hardly large enough for a small family, have walls of extraordinary thickness; the dominating idea being to keep out heat and cold. All the old ranch houses of the old Dons of Southern California were of adobe, either in a solid mass plastered over, or in brick form. Many of these had tiled roofs, more often shingles, or, in the tents of the Indians, palm leaves and brush formed the roof. These adobe houses are the simplest adaptation of the mission architecture, and when artistically treated, beautiful results are produced. Some of the smaller houses have a feature that is always found among the Spanish-Americans. Among the latter, it is what Americans would term an arbor, but the Spanish-Americans call it the ramada. It is formed of four or six posts nailed together at the top, the sides being completely open, the roof constructed of palm leaves or brush, which is used for a protection to the family. This outdoor room takes the place of the patio and here the family spend most of the time. The ramada idea readily adapts itself to the house of Mission tendencies. The building which we illustrate is constructed of stucco, and is treated in a soft cream color, while the trimmings are painted an apple green—the whole harmonizing with its rich tiled roof and is essentially artistic in its setting. The front is graced with a very handsome portico, which shows the colonnade effect of five arches, three in front and one on each side. The house extends back, as will be seen from the plans, and is much larger than would be supposed from a front view. On the left there is a semi-patio, which is one of the characteristics of this school of architecture. This patio forms a series of arches, and within, growing luxuriantly, are palms, choice tropical trees, and shrubs, producing a most artistic effect. The house has naturally a perfect setting, being surrounded by ample grounds, and virtually on the Arroyo Seco, a deep gorge filled with verdure, which, to a certain extent, forms a background and brings out its admirable features. The trees and shrubbery are also arranged to heighten the effect. Mr. Joseph J. Blick, 145 East Colorado Street, Pasadena, Cal., was the architect of this residence.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A DOORWAY IN A HAMBURG HOUSE.—See page 102.

A MODERN RESIDENCE AT ROCKFORD, ILL.

WE present herewith in this issue, on page 110, a modern residence, which has been recently completed for Mr. Aubrey T. Barnes, at Rockford, Ill. The engraving shows an elevation which has many excellent features and good detail. The underpinning and first story are built of paving brick, uniform in color, and the trimmings are of red sandstone. The upper story is of wood, with the exterior framework covered with sheathing, paper, and clapboarding, and is painted a dark green, which is quite in harmony with the dark red paving brick in first story. The roof is covered with shingles and left to weather finish. Dimensions: Front, 42 ft.; side, 46 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. This house is planned with two fronts; it is 150 feet from the street and 120 feet from Rock River. The kitchen is placed at the front toward the street, while the library and dining-room have the view down and up the river. The entrance from the street is through a vestibule, trimmed and paneled with sycamore. The front hall is trimmed also with sycamore, and it contains an ornamental staircase with broad steps, and columns rising up to ceiling. This staircase has a broad landing, with a paneled seat thrown out into a bay window. At the right entrance is an attractive nook, with paneled seats and window. The parlor, or reception-room, is trimmed with white pine, treated in white enamel. The library is trimmed with Belgium oak, and it is provided with an open fireplace built of brick, and furnished with tiled facings and hearth, and mantel of excellent design. The dining room is an attractive apartment, is trimmed with mahogany, and has corner china closets and buffet built in. It has a floor laid with brick and highly polished. The butler's pantry is fitted up with drawers, cupboards, and closets complete. The kitchen and its apartments are most complete, and they are trimmed with pine and finished natural. The second and third floors are trimmed with pine and treated with ivory white paint. The second floor contains four bedrooms, sewing-room, bathroom, servant's bedroom, with private stairway to kitchen, six closets, and linen closet. The bathroom is provided with a porcelain lined tub and fixtures, and exposed nickelplated plumbing, made by Peck & Co., of Chicago, Ill. The third floor contains two bedrooms and ample storage room. A cemented cellar contains a hot-water heater made by the American Heater Company, of Rockford, Ill., and other necessary apartments. Cost, $6,000, complete, ready for occupancy. Mr. D. S. Schurman, architect, Rockford, Ill. The contractors were as follows: David Carlson, carpenter; P. H. Peterson, mason; P. O. Craddick, plumber. The house is screened with screens made by the E. T. Burrows Company, Portland, Me.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

PLAN OF SECOND FLOOR

PLAN OF FIRST FLOOR

A SPANISH-AMERICAN HOUSE AT PASADENA, CAL.—See page 103.

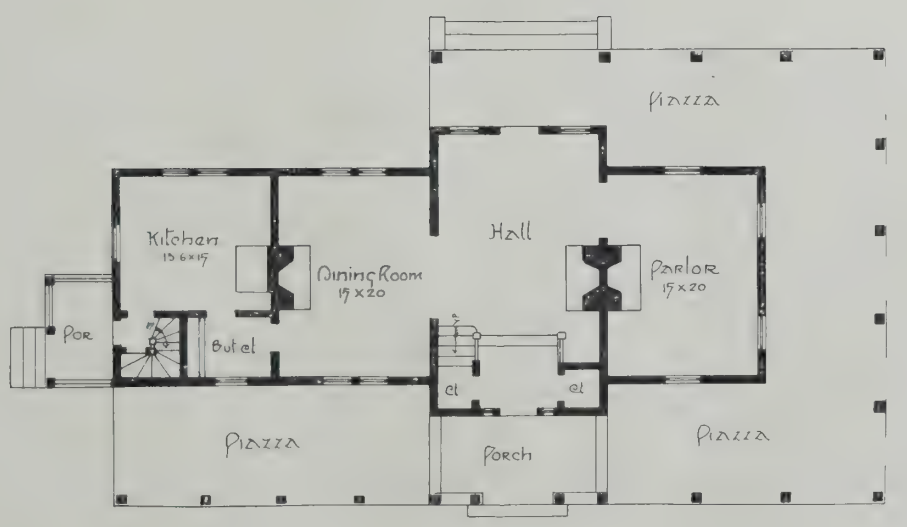
MR. JOSEPH J. BLICK, ARCHITECT.

A GAMBREL-ROOFED DWELLING AT BRIDGEPORT, CONN.—See page 102.

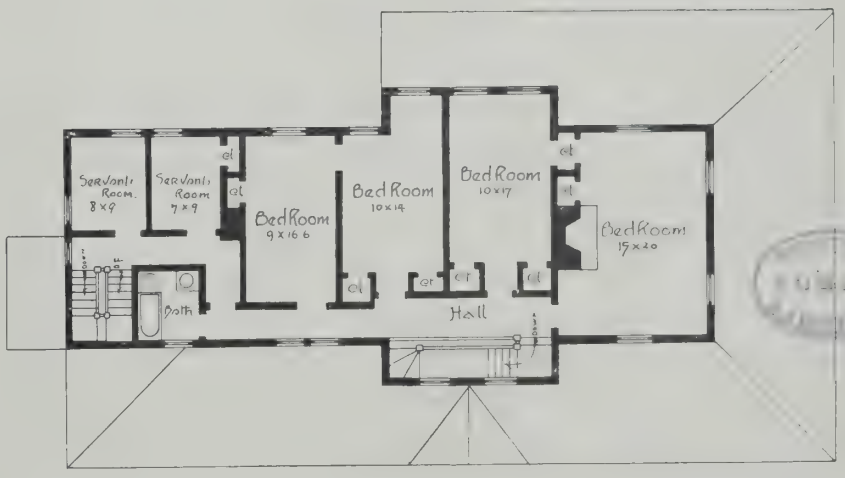
MR. CHARLES T. BEARDSLEY, ARCHITECT.

A MODERN RESIDENCE AT MOUNT VERNON, N. Y.—See page 102.

MR. FRANK MARION WRIGHT, ARCHITECT.



First Floor



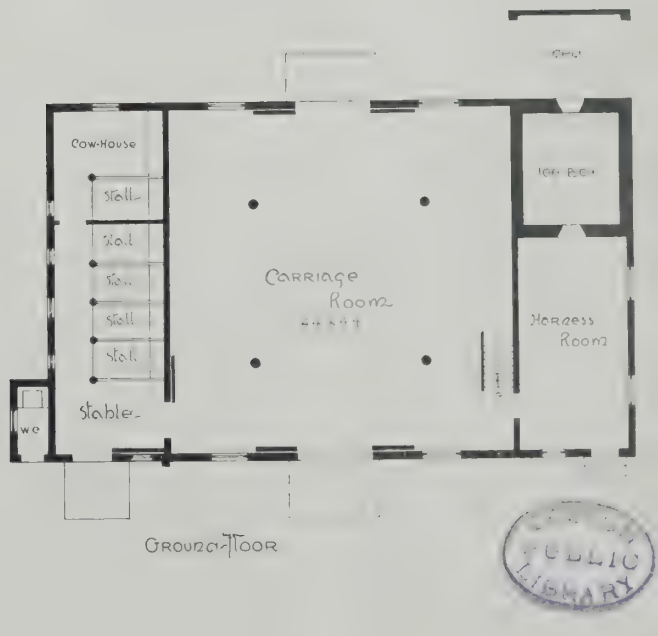
Second Floor

MODERN SUMMER RESIDENCE AT DEAL BEACH, N. J.—See page 102.

MR. JAMES BROWN LORD, ARCHITECT.

"SUNNY BRAE," A RESIDENCE AND STABLE AT PROSPECT AVENUE, HACKENSACK, N. J.—See page 115.

MR. WILLIAM A. LAMBERT, ARCHITECT.



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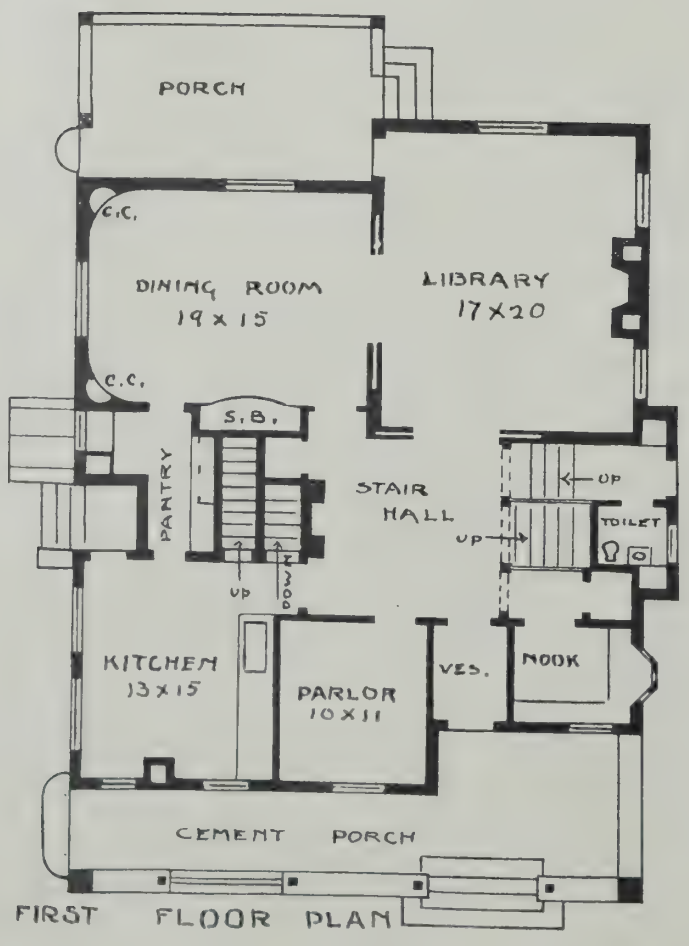
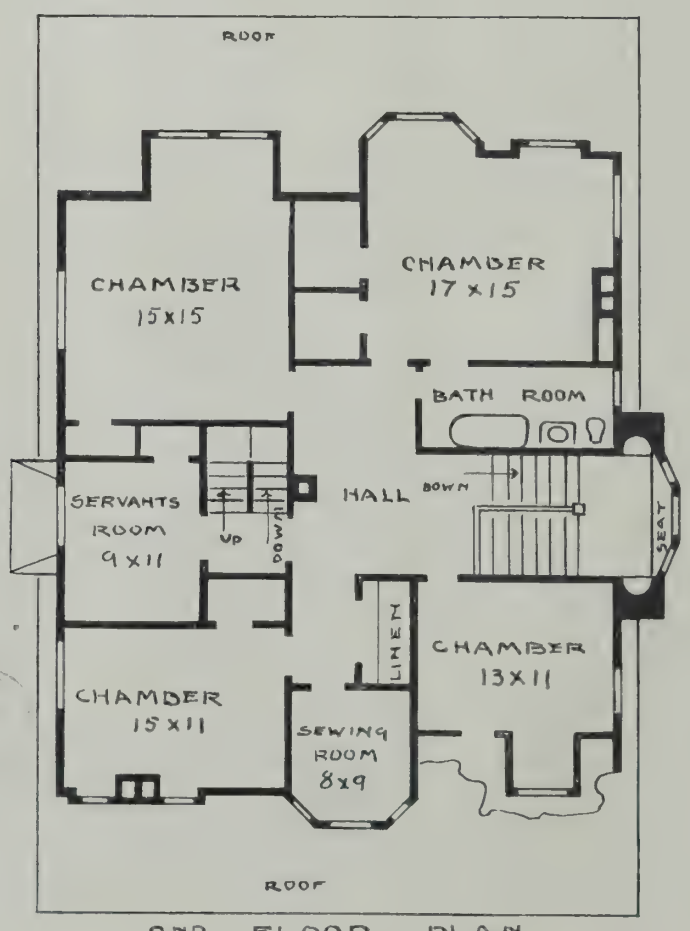
"SUNNY BRAE," A RESIDENCE AND STABLE AT PROSPECT AVENUE, HACKENSACK, N. J.—See page 115.

MR. WILLIAM A. LAMBERT, ARCHITECT.



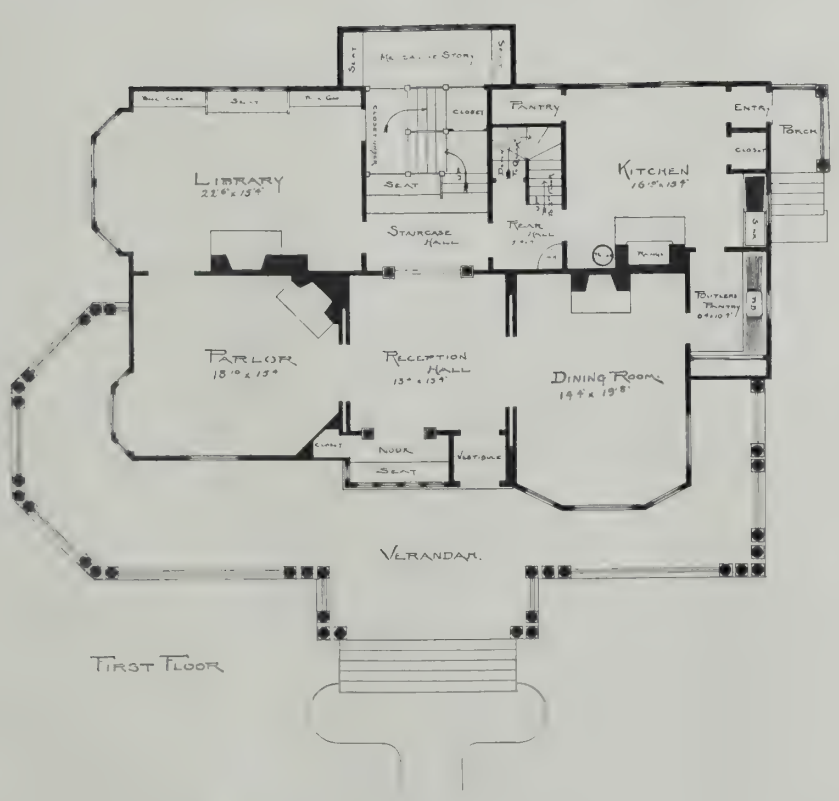
FIRST FLOOR PLAN



2ND FLOOR PLAN

A MODERN RESIDENCE AT ROCKFORD, ILL.—See page 103.

MR. D. S. SCHURMAN, ARCHITECT.



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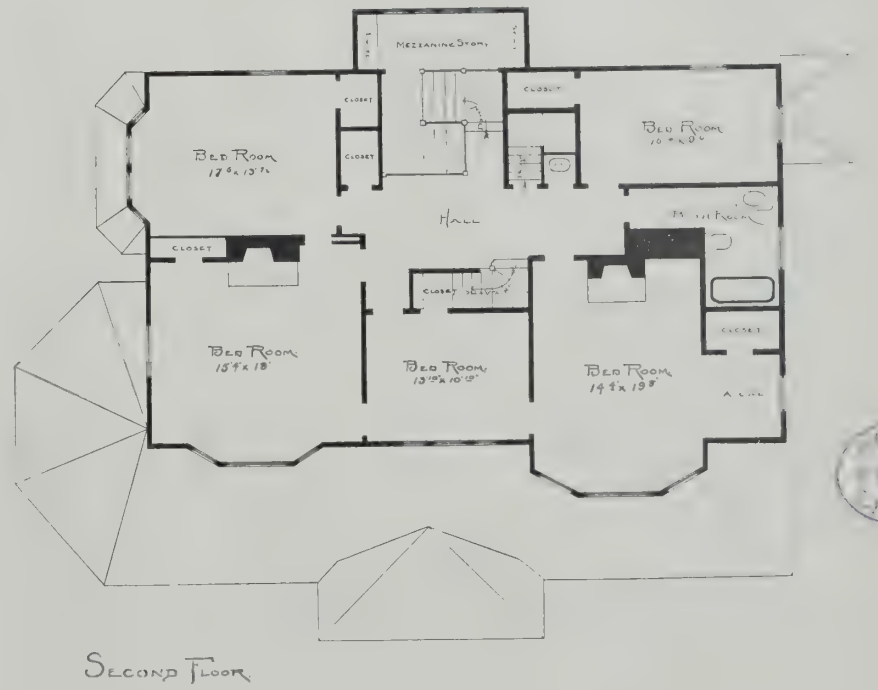
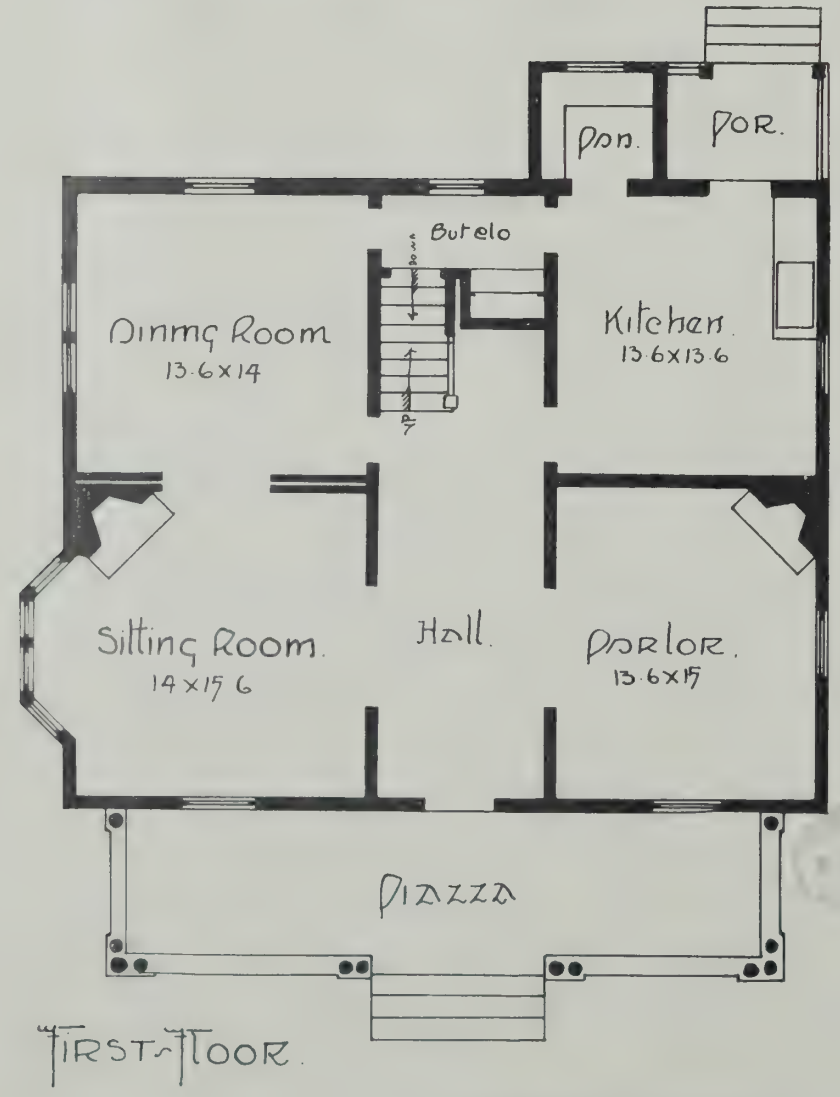
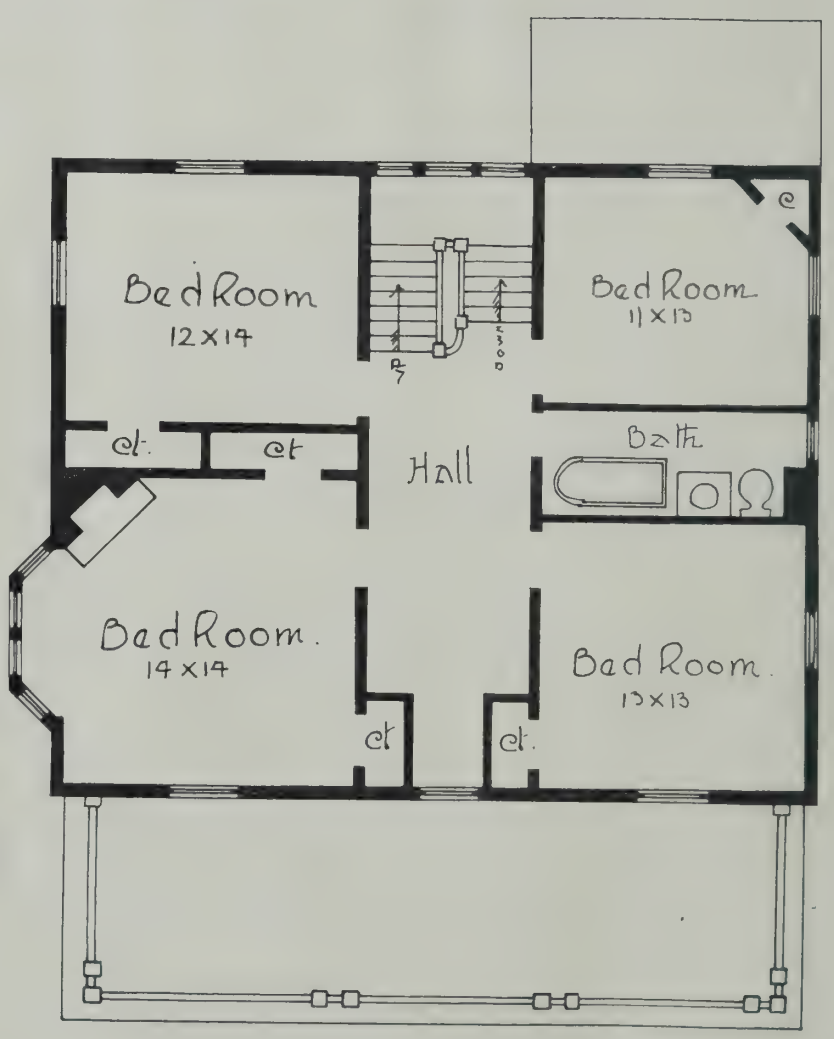


SECOND FLOOR

A MODERN RESIDENCE AT ORANGE, N. J.—See page 115.

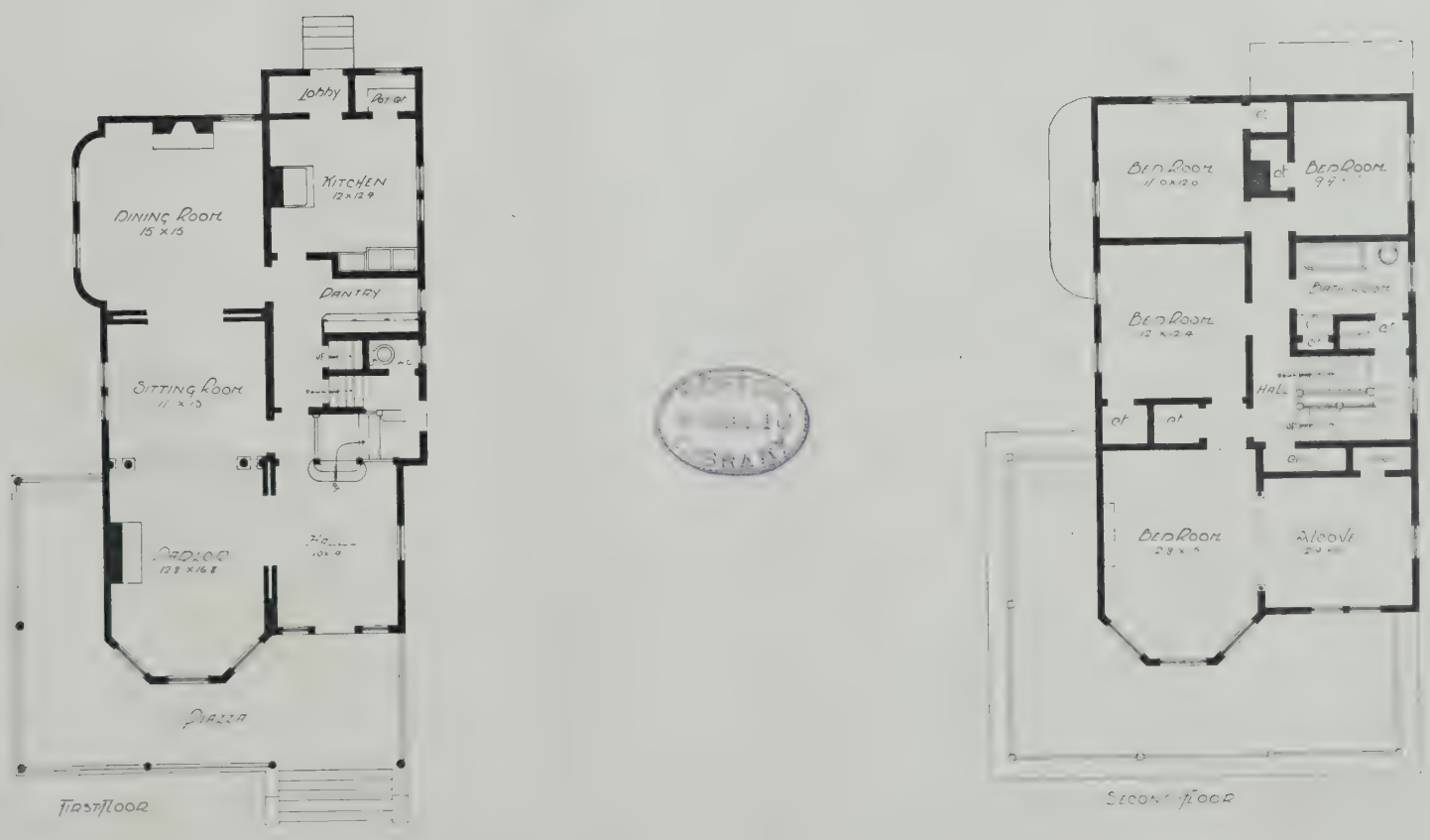
MR. JOSEPH J. MARSH, ARCHITECT.





A MODERN RESIDENCE AT HARTFORD, CONN.—See page 102.

MR. GEORGE CALDER, ARCHITECT.



A RESIDENCE AT BOROUGH PARK, BROOKLYN, N. Y.—See page 115.

MR. BENJAMIN DRIESLER, ARCHITECT.

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LIBRARY IN "OCHRE COURT," NEWPORT, R. I.—See page 115.

DINING HALL AT "OCHRE COURT," NEWPORT, R. I.—See page 115.

"SUNNY BRAE," A RESIDENCE AND STABLE AT PROSPECT AVENUE, HACKENSACK, N. J.

WE present herewith, on pages 108 and 109, in this issue, a residence and stable, which were erected for John Dunlop, Esq., at Prospect Avenue, Hackensack, N. J. The engravings presented show a house of Colonial treatment, with many pleasing features, including spacious verandas and porte-cochère, bay windows, and balconies. The underpinning is constructed of brick laid up in red mortar. The superstructure is of wood, clapboarded and finished with massive corner boards and heavy frieze. It is painted Colonial yellow, with white trimmings. The roof is covered with shingles and painted a dark red. Dimensions: Front, 53 ft.; side, 40 ft., not including piazza, which is twelve feet wide. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The hall is one of the principal apartments, and is finished in oak in the old Colonial style, with paneled wainscoting. The staircase, rising up in centre, is a very handsome one, with spindle and ball balusters, and spiral turned and fluted newels, all from special design. The parlor and library are trimmed with whitewood and finished in old oak. Each have bay windows, with open fireplaces trimmed with tiles, and Colonial mantels. The den is trimmed with white pine natural, and has a hardwood floor. The dining-room is a spacious apartment, finished in Colonial style, with ceiling beams, paneled wainscoting, large bay, and an arched recess for buffet. The butler's pantry is furnished with dressers, sink, etc. The kitchen and laundry are trimmed with whitewood and fitted up with wainscot, wash trays, range, sink, etc., complete. The second floor is trimmed with whitewood and finished natural. It contains an open hall, six bedrooms, closets, conservatory, and bath; the latter wainscoted and fitted up with porcelain fixtures and exposed nickel plumbing. The third floor contains two servant bedrooms and ample storage rooms; several extra bedrooms could be provided if desired. The cemented cellar under whole of building contains a furnace and other necessary apartments. The building is provided with gas, electric light, electric bells, etc., and is heated with hot water throughout.

The stable is treated in a similar style of architecture, and is in keeping with the residence. It is 75 ft. wide and 45 ft. deep, exclusive of shed, and it rests upon a brick underpinning with stone footings. The framework above this underpinning is sheathed on the exterior and then clapboarded, and painted Colonial yellow, with white trimmings. The roof is shingled and painted a dark red. The interior is arranged in a spacious manner, with a large carriage-room, with entrances at either end. The large harness-room is fitted up with the usual hooks and harness racks complete; the ice box, large and spacious, used for cold storage; and the stable, containing the cow-house and four horse stalls, fitted up complete. The walls and ceiling throughout are ceiled up with narrow beaded yellow pine finished with hard oil. The second floor contains ample storage room for hay and man's room. Mr. William A. Lamber, architect, 99 Nassau Street, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

"OCHRE COURT," AT NEWPORT, R. I.

THE residence of the late Ogden Goelet, Esq., at Newport, R. I., called "Ochre Court," on Ochre Point, is one of the most notable houses in that place. It is, perhaps, the most artistic creation of its architect, the late Richard M. Hunt. It is built in the French château style. The superbly kept grounds are entered by an elaborate gate, and the porte-cochère gives entrance to a large hall, which rises through three stories. The hall is built of white Caen stone, and has a marble floor, marble stairs, and wrought iron balustrade. The library is in the Louis XVI. style, and looks out over the cliff; it is finished in oak and gold. The dining-room has a double fireplace, a decided novelty, and the ceiling has a mural decoration, and the walls are covered with tapestries. The room is finished in oak and gold. See cuts, page 114.

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A VIEW OF THE EXTERIOR OF "OCHRE COURT," NEWPORT, R. I.

A MODERN RESIDENCE AT ORANGE, N. J.

WE present herewith, on page 111, in this issue, a modern residence, which has been recently completed for Joseph J. Marsh, Esq., at Orange, N. J. The elevations are most attractive in their execution, and the plans are most excellently arranged. The underpinning is constructed of North River brick laid up in red mortar. The superstructure is built of wood, and the exterior framework is sheathed, papered, and then covered with shingles and left to weather finish natural, while the trimmings are painted white. The roof is covered with shingles and stained a moss green. Dimensions: Front, 56 ft.; side, 42 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The entrance is through a vestibule, with paneled walls and ceilings, which, together with the reception and staircase halls, dining-room and library, are trimmed with quartered white oak. These rooms have paneled wainscotings and ceiling cornices. The floors on first story are laid with quartered white oak. The nook and stairway hall are separated from hall proper by columns, forming an arcaded effect, the former containing a paneled divan. The staircase is of handsome design, with broad landing and seat, newel posts, and balusters. The mezzanine story, with seats and cluster windows, is an attractive feature. The parlor is treated in white, and it contains an open fireplace, trimmed with white glazed tiled hearth and facings, and a mantel made from special design. The library has a paneled seat and bookcases built in. This library, and also dining-room, have open fireplaces built in, with tiled facings and hearth, and mantel. The kitchen and its apartments are trimmed with yellow pine, and are furnished with all the best modern fixtures complete. The second floor is trimmed with whitewood and then painted white. It contains five bedrooms, seven closets, and bathroom, the latter wainscoted and fitted up with porcelain fixtures and exposed nickelplated plumbing. The third floor is trimmed with cypress and finished natural. It contains four bedrooms, servant's bathroom, and billiard-room. A cemented cellar contains laundry, furnace-room, and other necessary apartments. The building is lighted by gas and electricity. Mr. Joseph J. Marsh, architect, Lindsley's Building, Orange, N. J.

Our engravings were made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT BOROUGH PARK, BROOKLYN, N. Y.

WE present on page 113, in this issue, a residence which has been recently completed for William A. Reynolds, Esq., at Borough Park, Brooklyn, N. Y. The engravings present a design with elevations of unusual attractive appearance, clean-cut in their style, and having excellent detail. The underpinning is built of red brick laid up in red mortar. The superstructure, of wood, is covered on the exterior framework with sheathing, paper, and clapboards; the gables are covered with shingles. The whole is painted a dull cardinal red, with light cream trimmings. The roof is covered with shingles and stained a dark

moss green of H. W. Johns' make. Dimensions: Front, 28 ft.; side, 50 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. One of the chief characteristics of this dwelling is the extremely favorable conditions of the consecutive rooms connecting with the hall. The interior throughout is trimmed with cypress, cabinet trim on ground floor, and the whole finished natural with Berry Bros'. varnish. The hall is an attractive apartment, with good dimensions, and containing an ornamental staircase turned out with newel posts, balusters, and rail. The parlor and sitting-room are separated by an archway supported on columns, with capitals of Ionic style. The former has a chimney breast, with tiled trimmings and mantel. The dining-room is circular in form at one side, and is trimmed with oak. It contains an open fireplace, trimmed with tiled facings and hearth, and mantel made by A. S. Nichols Company, of New York. The butler's pantry, of good dimensions, is well fitted up with drawers, shelves, cupboards, etc. The kitchen is provided with a Boynton range and all the best modern improvements. The second floor contains four bedrooms, with large, well fitted up closets, alcove, and bathroom, the latter wainscoted and provided with a Standard Manufacturing Company's porcelain lined tub and fixtures, with exposed nickelplated plumbing. The third floor contains two bedrooms and ample storage room. A cemented cellar contains a Richardson & Boynton furnace and other necessary apartments. The house is glazed with glass made by the Pittsburg Glass Company, and the hardware furniture is provided by Russell Irwin, of New York. Mr. Benjamin Driesler, architect, 1432 Flatbush Avenue, Brooklyn, N. Y.

Our engravings were made directly from photographs of the building, taken specially for the Scientific American.

DONATELLO'S PULPIT, S. LORENZO, FLORENCE.

Donatello is the greatest sculptor of Italy, with the exception of Michelangelo, and no one has expressed the Christian ideal so well among the Germano Latin peoples. Without neglecting the purity of forms and the harmony of lines, which so often preoccupy artists, he devoted himself largely to expression. He was born in 1386, and died in 1466, and his long life was devoted to the production of a large number of beautiful statues in the round, bas-reliefs, and one of the two great equestrian statues of the Renaissance.

In San Lorenzo, one of Florence's great churches, he sculptured two pulpits, in which he presented a whole series of events in the life of Christ, the first dealing with the Crucifixion, the Descent from the Cross, Christ before Pilate, and the Entombment, in the first pulpit, and in the second the Descent in Limbo, the Resurrection, the Ascension, an Ecce Homo, and the Martyrdom of S. Lorenzo, as well as the Holy Women at the Tomb and the Descent of the Holy Spirit. The second pulpit, which is shown in our engraving, is conceived in the same style as the first, except that certain architectural accessories, such as pilasters separating the groups, have been abandoned, which consequently makes it less cold and formal. The decorative frieze of children at the top is retained, however. See illustration on page 101.

The whole work is among the most important examples of Donatello's remarkable gift for grouping considerable masses of people, most of them in violent action. The pulpits belong to his latest period, 1453–1466.

Acoustical Properties of Buildings.

Theory, however true, and based on scientific deductions, has not always been applied with success. There has been some neglected factor, or the imperfections of practice have considerably discounted the results. The architect, above all professional men, is aware of the discrepancy in a great deal of his design and constructional work. The most perfect applications of theoretical science have been found wanting, and this fact is forcibly exemplified in the application of acoustical principles to building. Very few architects have been able to apply even the little science we have on the subject to buildings, simply because the principles of a perfectly acoustic structure, as given by theorists, can not be practically utilized. For example, the perfect acoustic form sectionally of a room or hall would be trumpet-shaped; but this idea would involve structural modifications of walls and roof or ceiling of a more or less impracticable kind. Many of the designs for concert-halls and theatres have shown the theoretical form of plan and section—namely, a curved or sloped floor and ceiling, but which their authors would have hesitated to have committed themselves to in actual building. More to the point would it be if the architect considered the question of roofing, of the proper heights for ceilings and their shape, and the absorbing power of the walls and materials and furniture, as upon these depend very largely the audibility of the room. Many architects have fallen into the mistake that if they copied a well-known auditorium of acoustical efficiency they would secure the same results—not considering that the effect will depend on the materials it is built with and the real size. The copy must be exact, both in materials and scale, or the result will be different. In one rectangular room the acoustical qualities may be perfect, in another of similar proportions and size very much the reverse—all because the materials and absorbing power of the walls are not the same in both. Much disappointment has therefore been experienced in the acoustic effect of auditoriums in which the best plans and latest theories have been followed. The fact is that the copy is larger or smaller, according to the requirements for accommodation, or the construction is different—fireproof materials may be adopted, the walls are plastered on metal laths, the galleries are of steel and concrete. Each of these changes demanded some compensating alteration in the plan or proportion. These differences have not been suspected by the architect, who thinks that if he follows the plan of a successful building it will give him the desired result. Again, the acoustical qualities necessary for a theatre or lecture-hall are not required for a concert-room or opera-house, where music is the predominant consideration. One building requires the property of reverberation to be reduced to the lowest value; in the other resonance and reverberation are often desirable qualities. Both these properties depend on the arrangement and materials.

The practical difficulties, therefore, of carrying out the theoretical principles of acoustics in the plan and construction of buildings have created a distrust in the minds of architects, and have to some extent discredited the science as one of practical realization. The rules that have been formulated, based on proportions and curves founded on the absorbing power of the materials contained, are too complicated for general use. In these remarks we do not propose to discuss the subject mathematically, but only to point to a few of the ascertained facts and principles, for we believe the architect will not readily accept for his guidance rules that are contrary to those forms and proportions he has been accustomed to employ. He may, however, be induced to follow certain general principles in planning and roofing, and to employ materials that will give the best results, and by which he may be able to estimate the reverberation in any auditorium from the plans and specifications.

In our present remarks we will simply refer to a few of the practical deductions that have been made from experiment relating to the form and proportions of rooms intended for large residences. We presume the reader is acquainted with the principles of the science, such as he may learn from such a useful elementary work as "The Acoustics of Public Buildings," by Professor Roger Smith, and other treatises. The laws that govern sound and light are to some extent analogous, and the popular illustration of sound propagation being like the undulations on the surface of water caused by anything dropped is a good one, and these simple laws of the conduction of sound through air or other media are easily comprehended. But these analogies must not be carried too far. Waves of sound are transmitted, broken, reflected, or deflected much in the same manner as the waves or ripples on the surface of water. Some bodies reflect sound, others reinforce it by sympathetic vibration; but the differences in the media of transmission must be taken into account. Sound-waves are continually being broken and modified by contrary currents, draughts, different densities of the air, and other causes. The architect is mainly concerned to know what are the best forms of building, and the best materials he can employ to prevent absorption. The reflection, deflection, conduction, and absorption of sound are the most important of the laws required by him. We may enunciate one general proposition: that the most theoretically perfect form may, from various circumstances, such as absorption, obstacles, etc., be less successful in results than less perfect plans in which these matters have been studied.

One of the questions which primarily has to be considered is the power of the voice, or the dimensions of a building in which a speaker can be heard without difficulty. Writers have generally referred to the natural diffusion of sound in the open air on a calm day. Saunders showed by his experiments that when a person read from a book on a still day on an open plain he could be heard 92 feet in front, 75 feet on each side, and 31 feet behind, and if we draw these boundaries we have a circle flattened behind the speaker. Sir Christopher Wren gives more reasonable distances—viz., 50 feet in front of the speaker, 30 feet on each side, and 20 feet behind, a circumscribed area large enough to seat about 1,000 persons—a more useful standard. With galleries, a hall or church could on this calculation well accommodate about 2,000—the extreme number that can see and hear comfortably in a church. Speaking first of direct radiation of sound, the principle upon which a large class of buildings depend for sound—as theatres and halls—height and shallowness of depth are desirable. A larger quantity of air than absolutely necessary is to be avoided, as the more air there is, the more vocal exertion is required to set in vibration, to say nothing of disturbing causes like ventilating appliances, which cause a contrary current to be established in the auditorium. M. Lachez and many other experimentalists have established the fact that a large amount of air above and behind a speaker, which his voice has to set in motion, is objectionable; and the same rule applies to the size of the auditorium: hence, an approximate rule for ordinary rooms is that, other things being the same, the room or hall should be low in proportion to the width. By restricting the room at the platform end, making it low and without too much space behind the speaker or vocalist, its length may be increased; and this is practically effected by a lecture-room with a platform or orchestral recess or apse. One writer says: "For lecture and schoolrooms a height of 2, a depth of 3, and a breadth of 4 has proved extremely satisfactory, the speaker being on the longest axis. For small churches, court, or other rooms, when the speaker is on the shortest axis, a height of 1, width of 2, and depth of 3 has proved good." The same authority says also: "On account of the nodal points established by the columns in nave and aisle churches, a length of 4 to 5, width of 2, and height of 1 to 1¾ works well. This is for cubical contents; but on account of the lower ceiling in the aisles, the nave ceiling may be greatly increased in height over the above proportions." The proportions given by the above figures give a rather low building, but a height of 3 can be given on account of the low aisles, and this proportion will agree with the proportion of many modern churches of this type. For theatres a height of 3, breadth of 4, and length of 5 is said to be satisfactory, and many of the Chicago theatres are of this proportion.

The form of floors and ceilings has a considerable effect on the acoustic properties of a building, though they can not always be adopted. Mr. Scott Russell, in a paper published in 1839, and also Mr. Lachez, have both considered the question. The seats are arranged on a concave curve called the "isacoustic," or equal-hearing curve, and this plan has been adopted in some lecture-halls and churches. According to this curve, the seats dip down a little near the platform, and then gradually rise, so that all the lines of sight converge to one point—that of the speaker. The curvature required will vary according to the height of speaker. The position and height of the speaker being determined, and that of the first auditor's head, a line is drawn from the lecturer's mouth to the first auditor's head, and at horizontal distances 2 feet 6 inches between the backs of seats; and allowing 18 inches for each successive seat in height, a series of points are fixed which form the curve. The curve is explained in many books on acoustics, and we merely refer to it here. The same object is sometimes attained by making the main floor slope upward from front to back. In the formation of the ceiling much also can be done to improve the radiation of sound. In a recent competition set of drawings for a Congregational church at Woking, the architects, Messrs. Cubitt and Collinson, in their design showed a raking ceiling over the nave, sloping down from tower end to apse, with the object of reinforcing the sound-waves from pulpit and choir, this raking ceiling being ingeniously concealed by open lower braces and ceiling collars of roof, so that while a sloped ceiling is provided for sound like the sloped floor, the visible roof retains its horizontal form. These departures from the normal construction of floor and ceiling are, of course, impossible in buildings of any architectural character; but there are various modes of dealing with the ceiling that ought to be adopted in concert and lecture rooms. Where they are flat they should never join the walls at right angles, but have coves or springing curves; and these curved portions of the ceiling should be brought down as low as possible round the platform. The volume of air is thereby reduced, and unpleasant echo avoided. In theatres the ceiling of auditorium should be as nearly as practicable raked from the proscenium arch to a point over the highest gallery sufficient to give head room. This slope may be curved, and the ceiling stepped and coved to prevent reverberation from the rear wall of theatre. Indeed, a good acoustical ceiling would follow the proscenium arch for some distance, and not, as generally the case, form a deep break between them.

Speaking of the pillars, aisles, and timber roofs of Gothic churches, Lord Grimthorpe observes, so far are these from "being worse for hearing in, they are generally better than the wide-spread buildings, all under one span, like a railway station, which it was the fashion to erect in large towns," and he observes, that "some of the worst places for hearing in that I know are buildings all under one roof, and of far less capacity than many churches, both old and new, of the nave-and-aisle construction, in which large congregations can hear perfectly well." This opinion is borne out by many churches which we know. The explanation is that in these wide-spanned and lofty roofs there is a large and unnecessary volume of air to set in motion, which the nave-and-aisle construction avoids. The open-timber roof and arcades, if not too lofty, also prevent reverberation and echo in many instances, which the large, smooth surface of a long and wide-span roof often creates. The kind of roof that is most favorable for sound is one ceiled or boarded round the braces and collars which cut off the triangular space above, and many of our polygonal-shaped church roofs are of this description. We have here confined ourselves to buildings of ordinary construction with straight or rectangular walls and roofs, and

have not said anything of those disturbing obstacles to the conduction of sound—like galleries and seats, which we leave for our next article. But the walls also can be so arranged as to facilitate the conveyance of sound. In fact, theoretical considerations would point to an enclosure of a flattened circular or elliptical form. We know indeed that the ancient Greek theatre was a very perfect form for large audiences and sightseers. They heard by direct radiation of the voice. The seats were arranged in slopes on the amphitheatrical plan above one another, and were continued in a horseshoe or semicircular form till they met the wall of the proscenium—a plan that has been followed in several theatres and orchestras, like the Handel Orchestra at the Crystal Palace; also in the planning of lecture theatres, in which the seats are arranged in semicircular form around the lecturers, and raised on the principle of the isacoustic curve, by which each auditor has uninterrupted sound and vision. But as we have before hinted, buildings with curved walls do not come often within the practical requirements of the architect, and can only be adopted for theatres, amphitheatres, and for concert-halls of a large and special class. Our chief purpose is to show that a great deal may be done to render our ordinary halls and concert-rooms acoustically satisfactory by the adoption of certain rules and materials in their construction, some of which are within the architect's control.—The Building News.

Planning a Music Hall.

THE new Symphony Hall, which is to be the home of the Boston Symphony Orchestra, is, perhaps, the first building ever erected, either in this country or abroad, whose acoustic properties were not, during the planning and construction, very largely a matter of mere guesswork, says the New York Sun. Long before the walls were up it was known with great accuracy what the acoustic qualities of the auditorium were to be, and the architects proceeded with their work in entire confidence that the acoustic principles to which they were adapting their plans were scientifically sure.

This certainty on a point so long considered almost hopelessly uncertain was due to the investigations of Wallace C. Sabine, assistant professor of physics at Harvard University, who has been engaged in studying the subject of architectural acoustics since 1895, when he was asked by the Harvard Corporation to remedy the acoustic defects of a college lecture-room. Preliminary study of the problems involved led to a complete examination of the whole subject, culminating in the notable work done on the new Symphony Hall.

It has been a popular impression for a long time that acoustics practically applied was nearly, if not quite, a hopeless problem. People have seen a hall which was acoustically good, copied, as they imagined, exactly, with a result which was a total failure, and very naturally, perhaps, they have come to believe that the whole subject was beyond control. Books on acoustics abound in inconsistencies. One writer says, that the dimensions of a perfect music hall should be as 2 to 3 to 5; a second, as 1 to 1 to 2; and another, as 2 to 3 to 4. The whole matter, popularly and scientifically alike, has been in a state of confusion.

But as a matter of fact, the difficulty has been a lack of study and therefore of understanding of the various details that influence the acoustic properties of a public hall, and this lack the Harvard investigations have gone far to supply. It is now known that the acoustic quality of one hall will be exactly duplicated by that of another, if the second is built exactly like the first, only the model must be followed in every way, in material, proportion and arrangement. Nothing can be varied, even the slightest detail, without varying the acoustics also

Of course, it is almost impossible to make one hall a mere facsimile of another. New methods of construction or ventilation, a thousand details, in a word, will cause a greater or less variation. But it is now possible to calculate the effect of all these changes, and by making still other compensating changes to retain the special values of any auditorium that one may have chosen to take as a model for good hearing.

Symphony Hall is a case in point. The architects, McKim, Mead & White of New York, at first prepared plans for a building along classical lines, and Mr. McKim visited Europe for the purpose of consulting with scientific authorities in France and Germany. It was decided finally that a Greek theatre as a music hall would be too dangerous an experiment in acoustics; and it was first decided by the committee to follow the general proportions and arrangement of a well-known auditorium, the Gewandhaus, in Leipsic. But the seating capacity of this hall, only about 1,500, was too small, and the plan had to be abandoned. The new hall, with its two galleries, its stage recess, its sloping floor, and, above all, its increased seating capacity, is a copy of the old hall only in certain acoustical results, and not in the architectural means by which these results were attained. The Boston hall contains about 175,000 cubic feet more than the one in Germany; yet, owing to skilful reckoning and careful balancing, the reverberation of the former, as expressed in the formulas prepared at Harvard, is 2.31, against 2.30 for Leipsic.

The investigations at Harvard have embraced practically every detail of architectural acoustics, and have been carried on with a minuteness and a patience astonishing to the layman. Not only have the more obvious problems been studied, but calculations have been made to establish the acoustic differences between a room containing a small audience and the same room when completely filled; and something has even been done toward establishing the effect of plants when placed in an auditorium. The three essentials of a good music hall are, of course, fairly obvious: the sound from the stage should be sufficiently loud; the component parts of a complex sound must keep the proper balance of intensity; and a succession of sounds must come out distinctly, without confusion among themselves or from without. The problems arising on all these points have been carefully worked out, although the results of this study have not yet, in all cases, been fully tabulated.

In the important matter of reverberation, however, a most interesting statement has just been made, with particular reference, aside from the purely mathematical treatment of the subject, to the qualities which various objects have of absorbing sound. Sound is one form of energy, and can be changed into any other form. Usually it passes into heat. This process of decay, as it is called, is known as absorption; and sound is absorbed, more or less, by any substance with which it comes in contact.

Reverberation is sufficiently well understood. An echo is a special example of it, but the more general sort of reverberation is a confused mass of sounds, as it were, which, unlike an echo, is incapable of being analyzed into its various parts. Reverberation has spoiled many a public hall, but on the other hand a certain amount of it is not only not too objectionable but actually desirable in a good music hall. In the ordinary theatre, where reverberation is reduced to the lowest practical limit, an orchestra like the Boston Symphony would sound muffled and dead, as compared with a performance in a hall like its present one, where the conductor, Mr. Gericke, demanded, in order to obtain the best results, that the architects should not eliminate the reverberation below a definite limit.

The use of various materials as absorbents of reverberation, therefore, and the calculation of the effect of each, is one of the most interesting problems of acoustics. The lecture-room in Cambridge, where the present experiments were begun, was so exceedingly slow in absorbing sound that a word spoken in an ordinary tone of voice was audible five and a half seconds after it had been uttered. During this time even a very deliberate speaker would have uttered a dozen or more succeeding syllables. These successive enunciations were blended into a loud noise, through and above which it was necessary to distinguish the orderly progression of the speech. This could not be done across the room, and even near the platform the effort to listen for any length of time was wearisome. By bringing into this room some 1,500 cushions from the seats of Sanders' Theatre, in Memorial Hall, and arranging them so as to expose the largest possible surface, the length of reverberation was reduced to 1.14 seconds—or about a fifth of what it had been before. The cushions had absorbed the rest of the reverberation.

In calculating absorption an open window is taken as the unit, since it makes no difference whether sound escapes into the open air or is transformed to heat in some substance, and an equal area of any other material is compared with this unit as a standard. The absorption of glass, for example, is thus expressed by the fraction of .025, and of pine sheathing by .061. More curious are the figures for persons, or for an audience *en masse*. A woman absorbs more than a man for the reason that her dress offers a greater surface. For the same reason a person sitting in a scattered audience absorbs more than he would if he were one of a crowded audience. An audience is reckoned as a bounding surface, like a floor, in these calculations, and its area is measured in metres. Here is a table of comparative values:

Audience per metre	.96
Audience per person	.44
Isolated woman	.54
Isolated man	.48

To give still another example, a settee upholstered in hair and leather has a value of 1.10, while a plain settee of ash is only .039.

Without attempting to go into the other branches of this novel inquiry, it will be easy enough to see how the Harvard investigations have raised architectural acoustics to a position it never before held, and made it, as in the new Symphony Hall, a trustworthy science.

FROM a number of very carefully kept records of the weight of steel required for the skeleton of the average office building the following formula was deduced: $W = N.F. (15 + 7/10) N$, in which W is equal to the total weight of metal in pounds, N the number of floors in the building, with the roof considered as a floor, and F the square feet in each floor. Then to find the weight of beams and fittings required in the floors we multiply 15 by the factor N.F and for the weight of columns multiply 7/10 N by the same factor. The sum of these weights is equal to W. This formula is offered as being sufficiently accurate for preliminary estimates on the weight of steel skeletons for an average building. It is taken from a paper by Mr. F. H. Kindl before the American Institute of Architects.

The "Bauwage" Used by the Cathedral Builders.

An interesting explanation has recently been given of the methods used by the architects and builders of the early cathedrals to determine the equilibrium of the arches and supporting columns. The various problems connected with their construction were solved by a graphic method, which involved the use of the "Bauwage," or building balance. This consisted of a flexible cord in the form of an inverted arch, passing over pulleys at either end, the cord being drawn into an equilibrium polygon by weights suspended at various points along the cord, each proportionate in position and amount to those which the arch would be required to carry at its various points. By means of weights connected with the cords passing over the pulleys at each end the system was supported and the horizontal force also measured. From the curve thus obtained, the various elements could be readily calculated and a reliable method of construction devised. The system was employed by the so-called master builders, who were included in a guild that extended over Europe during the Middle Ages. Through this guild the traditions and higher knowledge of the building art were confined to a few masters in each country, and there is every indication that they were endowed with more than mere artistic feeling and intuition in carrying out their constructions. The graphic method described was used before 1585, but previous to that time it is hardly thought to have carried with it any special knowledge of the laws of statics.—N. Y. Evening Post.

STAND-PIPES IN NEW YORK TO BE UNIFORM.—The rule is to be enforced requiring that all buildings which exceed 150 feet in height be equipped with stand-pipes. Not only will pipes have to be placed in these buildings, but the couplings will have to be of the standard used by the fire department. It is estimated that sixty per cent of the skyscrapers do not conform to this law and are in the condition of the Wells Building, at 18 Broadway, Manhattan, where, when the firemen attempted to couple the hose to the outside street connections, these were found not to be properly constructed, and the hose had to be dragged up nine floors before the firemen could operate. Another recent fire on Fifth Avenue caused the department much trouble. The description of the pipe as required by the department is as follows: These stand-pipes are to be of a quality sufficient to stand the necessary pressure (not less than 300 pounds to the square inch) to force a stream of water to any of the floors of the building or the roof, and are to extend from the cellar to the roof, with a two-way three-inch fire-department siamese connection placed on the street above the curb level, and connected to said stand-pipe. These stand-pipes are to have valves and two-and-one-half-inch outlets of the regular standard fire department pattern and thread, and hose attached thereto on each floor; outlets and valves are to be placed as near the stairs as may be practicable, and also in basements and cellars of all such buildings. All stand-pipes, couplings, and other fire appliances (the order further says) shall be of the regulation fire department pattern, to be approved by the chief of the fire department, and to be kept in perfect working order by a person who shall at least once a month make a thorough inspection of the same, and see that they are ready for immediate use by the fire department. The fire department has been very lenient so far with owners of buildings who have not complied with the law. In fact, it did not begin to enforce the law until last May. The plan for enforcing the law will be for the captain of each company to report on every building in his district which has not the proper stand-pipes. The owners of such buildings will be given sixty days in which to comply with the law, and then the penalties will be enforced.—Fire and Water.

KEEP THE CELLAR CLEAN.—A great deal of sickness families suffer could be easily traced to the cellar. The cellar not usually opens into the kitchen, the kitchen is heated, and the cellar is not. Following natural laws, the colder air of the cellar will rush to take the place of the warmer and, therefore, lighter air of the kitchen.

This would be well enough if the cellar air was pure, but often it is not; partly decayed vegetables may be there, or rotten wood, etc. The present time is opportune for a thorough cleansing of the cellar. A day should be taken to throw out, and carry away, all dirt, rotten wood, decaying vegetables, and other accumulations that have gathered there. Brush down the cobwebs, and with a bucket of lime give wall and the ceiling a good coat of whitewash. If a whitewash brush is not at hand, take an old broom, that the good wife has worn out, and spread the whitewash on thick and strong. It will sweeten up the air in the cellar, the parlor, and the bedrooms, and it may save the family from the afflictions of fevers, diphtheria, and doctors.—American Artisan.

AMERICAN SUPREMACY.

It is a well authenticated fact that the United States is unequaled by any nation in the entire world in the making of labor-saving machinery.

A most signal proof of this has just been given at the Paris Exposition, where J. A. Fay & Egan Co., the largest manufacturers of wood-working machinery in the world, of No. 209 to 229 West Front Street, Cincinnati, Ohio, were awarded the "Grand Prix," the highest award given at the Exposition.

This is the third time this firm has been similarly honored—they having received a like award at the Paris Expositions of 1878 and 1889. Their exhibit occupied the largest space of any foreign manufacturer, and contained a full line of machines for working and cutting wood in every manner, all in operation. The company's skilled corps of representatives explained the working of the different machines.

THE FAY AND EGAN EXHIBIT AT PARIS.

Among the more important of their machines exhibited are: New band-saw mill, patented September 18, 1900, and October 30, 1900; self feed band rip-saw, with knife-edge balance, patented February 27, 1900, and October 2, 1900; new triple drum sandpapering machine; new planer, with centre-geared rolls hung pivotally, patented December 19, 1899, February 6, 1900, and May 8, 1900; new spoke-lathe, with automatic lift to vibrating frame, patented December 19, 1899; new automatic gage-lathe; new band re-saw; new and improved methods of gearing; fixed knife-planer, patented June 26, 1900; vertical carboring machines, patented January 30, 1900, and February 6, 1900; heavy double cylinder dimension planer, matcher, and jointer, patented January 9, 1900, and March 20, 1900; new box-board matcher, patented December 19, 1899; new circular saws, patented April 24, 1900; variety wood-workers; "lightning" floorer, patented March 20, 1900; double end tenoner, patented June 5, 1900.

Where so many excellent specimens are shown in one firm's exhibit, it would be difficult to know which machines to describe, and lack of space prevents our going into their merits on an extended scale.

THATCHER FURNACES.

The Thatcher Furnace Company, of 240 Water Street, New York city, are distributing a neatly printed, excellently illustrated, and well-written booklet on their system of house-heating. The reading matter, which comes from the pen of Mr. George C. Penfield, is so good that we cannot refrain from quoting a few passages here.

"It is a known fact," says Mr. Penfield, "that in every system of artificial heating the amount of heat usually diffused through the house is but a small proportion of that developed by combustion. Even under the most advantageous application of preventatives, the temperature of the current at the chimney is generally much above that required to maintain an active draught in the fireplace; hence, the furnace that rectifies this hitherto unavoidable waste of hot air, and instead of its escaping allows it to be sent through the several pipes into the various apartments of the house it is the mission of the furnace to supply with warmed air—that furnace is the one which will most readily commend itself to the man who is looking for a perfect heating appliance. This has been found to be the case in the Thatcher tubular furnace, invented by Mr. J. M. Thatcher, who devoted more than forty years to the science and manufacture of warm-air furnaces and ventilation. This furnace is entirely original and simple in construction, and all the complicated and concealed flues with which the average furnace abounds, and which fill up with ashes and soot, causing untold vexation to the unhappy owner, are here conspicuous by their absence. It is practically self-cleaning, and owing to its tubular construction carries away the heat as soon as it is generated, sending a steady, well-ventilated volume of pure, warmed air through its various passages.

"Frequently heaters are so complicated in construction that the average house owner who installs them on his premises is unable intelligently to cope with their intricate mechanism, and while doing his utterniost to feel that he has made no mistake in selecting this particular furnace, it fails to meet his requirements. Hence the more simple in construction a heater is, the more satisfaction it will of necessity give, and this great advantage is found in the improved Thatcher tubular furnace.

"Thoroughly to understand just why this furnace has acquired the reputation it has, it will be necessary to go into details relative to its construction. Perhaps on the firepot of a furnace rests the greatest responsibility for the satisfactory results of its heating capacity, and after more than thirty-five years' use the *pointed* firepot has proved superior to all others. The advantages over plain ones are so apparent that it compensates for the extra trouble of making them. These points are about three inches long and cast solid to the firepot, and each point acts as an independent radiator, giving several inches more of radiating surface. They also separate the cold air, thus heating a larger quantity much quicker than it is possible to heat a solid body of air passing over a smooth surface. It is often thought by the average purchaser of a furnace that the size of the firepot denotes the heating qualities and various merits of the furnace, and that the larger the compartment in which combustion is generated, the greater amount of heat the furnace will supply. This is a mistake, as the heating capacity of a furnace depends almost entirely upon the amount of heating surface and its character. Many furnaces have large pots, but comparatively small heating surface, which burns more coal but will not do the work of a furnace that has a smaller pot with a large and effective heating surface. The Thatcher tubular furnace has replaced many of these furnaces, using the same warm air pipes with flattering results, showing conclusively that the fault lay entirely in the construction of the firepot.

"Another important feature about this section of the Thatcher heater is that it is *straight*, allowing perfect combustion and obviating the accumulation of ashes along its sides. Many years ago Mr. Thatcher experimented with the sectional or two-piece pots, but found the solid one, if properly made, much stronger, as dividing the pot weakens it and it consequently burns out sooner.

"Resting on the firepot is a heavy body, cone-shaped at the bottom, so that no soot nor ashes can accumulate. Passing through this body, which is the combustion chamber, around the sides is a series of heavy cast-iron tubes, perfectly gas-tight, through which a large amount of air passes from the outside. The smoke and products of combustion on the inside of the body are obliged to pass this tubular surface before they can escape to the upper radiating ring, thus heating the air passing through the tubes, in addition to that passing over and around the body. With this large and effective surface, the amount of air heated is three times greater than in other furnaces. Aside from this, the tubes, creating a suction, extract the heat quickly from the castings, not allowing the air to become overheated or scorched. This insures a pleasant and healthful atmosphere, which is indispensable from a sanitary point of view.

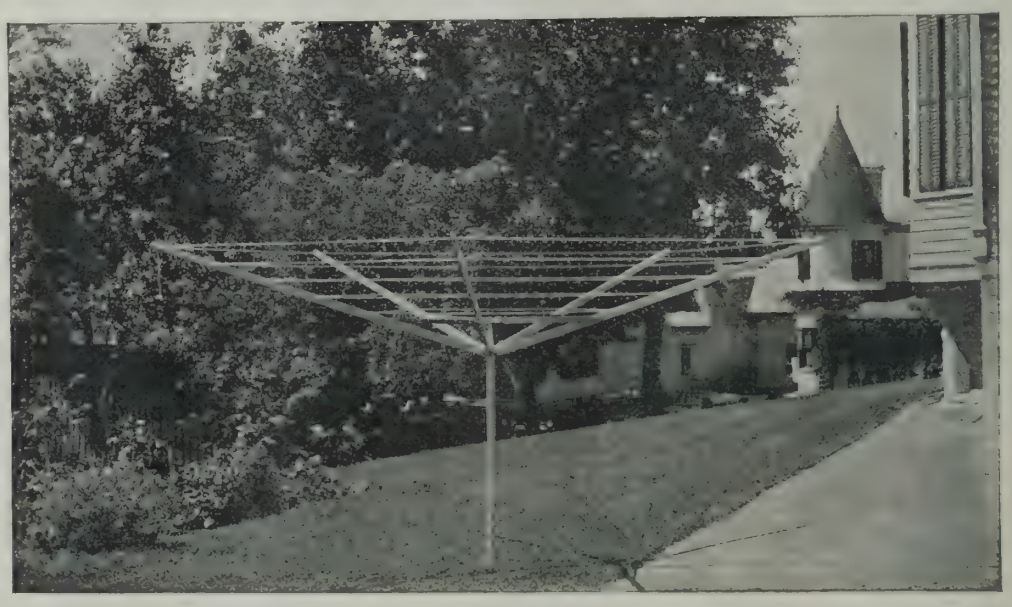
"A new patent revolving grate has been an invention that has added to the popularity of the Thatcher furnaces. The grate in the Thatcher tubular furnaces revolves by simply turning the handle, bringing all parts of the fire to the front. Clinkers can easily be reached through a small door, and removed through the slide grate at the bottom. This secures a perfectly clean fire on all sides, causing an even temperature on all sides of the pot. This action of the grate also prevents the ashes and coal from mixing. It is the clean, solid fire that does the work, and when coal can be burned without mixing with ashes it approaches the nearest to a new fire, which always gives the most heat."

The H. W. Johns Manufacturing Company, of 100 William Street, New York city, recently issued a neat, illustrated booklet of testimonials from the users of their asbestos roofing. How extensive is the use of this product is shown by the fact that it has found its way to the decks of the Mississippi steamers, and even as far South as Yucatan, Mexico, where it is employed for covering the dressing-rooms and boxes of a bull-ring. There are a number of testimonials from satisfied customers who have had the roofing in use from fifteen to twenty-five years.

New Orleans.—The territory upon which the city of New Orleans is built has an area of 24,932 acres, on both the left and right banks of the Mississippi River, within levees. It has an elevation of 33 to 20 feet, Cairo Datum; this slope occurring within 6,000 to 9,000 feet of the river banks, leaving a large surface practically level, with an elevation of about twenty-one Cairo Datum, or some eighteen feet below the high water of the Mississippi River and some four feet below that of Lake Pontchartrain; or, as the mean elevation of the Gulf is 21.26 Cairo Datum, never at any time above the level of the surrounding bodies of water. Six thousand acres of this territory are improved, being paved or covered by buildings; the remaining portion is composed of farms, gardens, suburban lands or swamps. All of this territory is now surrounded by levees, the elevation of which is 41 Cairo Datum on the river front, and 27 Cairo Datum along the upper and lower boundary lines, the lake front, and navigation canals.—A. F. Thead, C. E.

HILL'S BALCONY CLOTHES-DRYERS.

The clothes-dryer sold by the Hill Dryer Company, of Worcester, Mass., is manufactured in several styles. Although primarily intended to be attached to a house near a stoop or balcony, it can, when there is sufficient room, be placed in the rear of the house on the lawn, as shown in the accompanying illustration. The regular house-dryer is hung on a substantial arm made of galvanized iron tubing, and capable, if properly put up, of supporting a ton's weight. All the iron work is either wrought or malleable, and is heavily galvanized, so that there is no chance of rust soiling the clothes. The dryer top is always held open, and is locked to the post by a patent device, so that it cannot be blown away. The top has four arms, on which are stretched 100 feet of line. There are three sizes, holding 100, 115, and 125 feet of clothes line, respectively. The dryer has been used with success on every kind of house from a tenement to a country cottage, and is much less troublesome to manage than the lines with pulleys usually employed in the former class of structures.

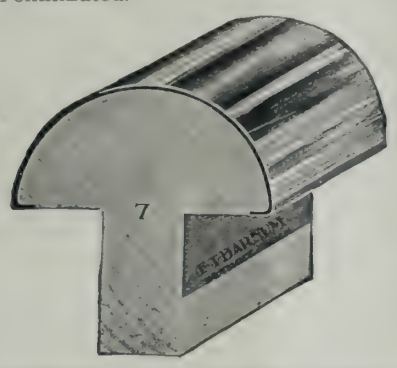


THE HILL CLOTHES-DRYER.

METAL SASH BARS.

IN all modern business places designed to display merchandise, the show-windows should be as little obstructed as possible; and to meet this requirement the all-metal sash bars were placed before the public several years ago.

These bars, however, were not very successful on account of difficulty in fitting them and on account of their tendency to rust. They, however, possessed so many excellent features that a substitute has been devised, the growing popularity of which is a positive proof that the undesirable features of the all-metal bars have been eliminated.



BARNUM'S METAL-COVERED SASH-BAR.

The new metal-covered sash bars are light, strong, handsome, and will not rust. The core of these bars is of hardwood, over which is drawn a heavy sheet of copper, bronze, German silver, or brass, all of which are non-corrodible. The metal covering is drawn through dies, giving a perfectly even and smooth surface, and when bars are placed in position they appear as solid metal.

They give to the windows the appearance of a handsome show-case. They are made in many sizes and shapes, one of which is displayed in this article.

Illustrated circulars, describing sizes and prices, may be obtained of E. T. Barnum Wire and Iron Works, Detroit, Mich., manufacturers of wire, iron, brass, and steel goods of all kinds.

BOMMER SPRING HINGES AT PARIS.

A GOLD medal was awarded unanimously at Paris to Bommer Brothers, of Brooklyn, N. Y. An examination of these goods is convincing as to their quality. Every detail pertaining to their construction has been studied with care. Cold rolled steel forms the body of the hinge. The bearings are turned out of solid steel rods. The

THE BOMMER EXHIBIT AT THE PARIS EXPOSITION.

springs are hard where the strains are great. When bronze is used all wearing surfaces are made of steel. The workmanship and finish are of high grade. One of the boards is devoted to steel hinges of various kinds of finish, while the other contains bronze hinges and steel hinges which have been bronzed, brassed, or nickeled. The flat cases below contain hinges and detached parts of the same, showing the construction in detail.

Art and Nature in Landscape Gardening.

IN the spring we receive the most frequent inquiries from amateur planters about shrubs, trees and herbs for what they call "decorative planting." Many persons who have acquired new homes in the country or in the suburbs of cities are moved to beautify them in some way, and the first thought that occurs to every one is to secure an abundance and variety of what are known as "ornamental" plants. It is not our purpose to make out any such list, and even if we considered it advisable, the season is too far advanced to begin to arrange for planting. Nevertheless, these requests suggest a word or two of counsel which may as well be repeated at one season as another. We have no novel doctrine to advance, nothing but a few principles which do not change every year like fashions in millinery.

The spring planting of trees and shrubs is practically over for the year, and where these have been planted by novices it is probable that they have been badly selected and planted in improper positions. Nevertheless, this fact is not utterly discouraging, for when once a land owner begins to take any serious interest in his home grounds it is probable that the habit will grow on him and become a lifelong and increasing source of refreshment and refinement. We have said that both planning and planting by novices are, as a rule, worse than unsatisfactory, for if there is any art which needs original aptitude, special training, and long experience for the highest success, it is the art of planting public and private grounds. This statement will be admitted by most men of cultivation, but practically they do not realize its truth. An engineer or a botanist is considered qualified to plan a public garden. Places of remarkable natural beauty, when once they are acquired by a city, are often put under the control of commissioners, who may have a fair education and experience in business, and if they have in addition to this what is known as good taste, they are esteemed perfectly competent to preserve the scenes, to develop their charms, and to devise facilities for exhibiting them. Gentlemen of wealth who have some cultivation consider themselves quite able to lay out their own places, especially if they have the help of some journeyman gardener, who often has no appreciation of the character and beauty of the grounds, and whose first work will be to despoil the scenery of all that makes it really valuable, and then begin the work of decorating it with flower beds, golden elders, and purple-leaved shrubs of various kinds. The worst part of the matter is, that the men who are utterly lacking in their ability to foresee what a piece of ground will look like a few years after they have set out to "improve" it, are quite unconscious of their lack of qualification, and have not the slightest idea that any such qualification is needed. Even if they were capable of taking such a look into the future, they would not be competent to pass any intelligent judgment on the result of their work. The fact is, that no one but a man of genuine creative faculty can just see what elements in a landscape are the essentials that ought to fix its character, or can estimate the relative proportional importance which should be given to each one so as to produce the best combined effect and invest the whole with a charm which is distinctly its own.

This brings us again to the point—that for the treatment of any piece of ground, public or private, the counsel of a landscape gardener of recognized standing should be at once taken. The novice who insists upon improving his own grounds must educate himself through his own mistakes. If he begins at the wrong end and buys a great many more novelties and oddities among trees and shrubs than he needs, and then wanders around in in his lot for a place to plant them, he will soon see that his crowded grounds have no unity of expression or of purpose. If, however, he will endeavor to set before his mind a clear and definite picture of what his house and grounds together are to look like, and will then attempt to construct his picture, he will not be led to choose a plant simply because the catalogue pronounces it beautiful, but because it is necessary to complete his idea and give expression to his thought. All this sounds very simple, but he will find it no easy task to create such a picture, even in imagination. But if he has in mind a design which is reasonably distinct, and for the details of which he can give intelligent reasons, he will certainly learn some things by his experience which very few of his fellow men understand. When he studies his house and grounds not only as a unit, but in their relation to what is beyond them, and endeavors to shut out what is distracting or unsightly, and preserves, within a fitting framework, the view of distant prospects that are pleasing, and when he attempts to provide for conveniences in the way of buildings and walks, and place them so that they do not disturb his picture, he will learn that it requires not only taste, but hard study, to solve the complex problem that he has in hand. He will learn, too, that even within the modest limits of his home acre there are chances for an individuality of plan and for a refinement and finish in the details which an artist of the first rank would not deem unworthy of his powers.

The objection is sometimes made to the work of artists in landscape that, after all, purely natural scenery is the most impressive, and the art of man can only interfere with nature to belittle it or weaken its strongest effects. But the true artist aims to help, and not to hinder nature. Even the broadest landscape can be improved, that is, adapted to human use and enjoyment, if it is treated in a reverent spirit. We do not attempt to thwart nature when we open her thickets and help magnificent trees in their development. We are working with nature if we encourage a screen of foliage deep enough to exclude the intrusion of some disagreeable object, or if we open vistas which will uncover to us the sky line made by a mountain range. Nature alone does not spread out for us broad stretches of meadow, but if we come to her aid she will give us all the turf we need. That is, the real artist emphasizes and intensifies here or subdues and qualifies there. He uses the art that mends nature, working in harmony with, and not against her. The truth is not thoroughly comprehended by persons who consider the true work of the landscape gardener to be the planting of flower beds and of ornamental shrubs. But, after all, it is this broad and catholic art which alone is satisfying everywhere, and which is just as useful in the preservation of the Yosemite Valley or the scenery of Niagara as it is in planning a pastoral park or the grounds about a country house.—Garden and Forest.

THE RAILROADS AND TIMBER CULTURE.—The question of systematic timber culture is commencing to be considered by the officials of American railways, and in some cases competent forestry officials have been secured to supervise the work. In one instance a plantation that was made about fifteen years ago is beginning to yield, and from an initial outlay of $128,000 it is estimated that 1,280,000 trees, worth $2 each standing, will be obtained within the next ten years, affording a net profit of $2,432,000. In this plantation the trees were the *Catalpa speciosa*, and when grown are straight and clear of limbs up to a small crown. The railroads of the United States consume about 1,000,000 acres of timber each year, as posts and ties have to be so frequently renewed, and the expense is no small item. As many railways already have landscape gardeners, it has been suggested that practical forestry be added to their duties, and the trees, in addition to their value as timber, would be used to beautify the grounds of the stations along the way.—N. Y. Evening Post.

HEATING ALL OUTDOORS.—An extraordinary requirement in a water-heating job is described in the letter we reprint below from a well-known contractor, who asks other men engaged in the heating business to express their views as to whether he may be fairly expected to heat a building with the windows open. Whatever the opinions expressed may be, it is his intention to bring them to the attention of his customers and abide by them. No stipulation was made for heating with the windows open in the original contract: "Last fall I installed a direct water house-heating plant with a guarantee of a capacity equal to 70 degrees in zero weather. I made the plant ample, as I usually rate a plant. I also placed a thermostat on it, which does work within 1 degree when the house is closed. But during the night the fire burns out in an effort to maintain 70 degrees with windows open to the number of four. The owner insists on 70 degrees with windows open; that it is ridiculous to ask a party to sleep with windows closed; that no decent person will do so; that I must maintain fire and heat as though the windows were closed. I wish to know if I am wrong in saying to the owner that this is an unusual thing to ask of a heating man, and unjust. If I am wrong I wish to know it."—The Metal Worker.

SIGN ADVERTISING IN FRANCE.—Clamors have been raised from time to time against the numerous advertisements stuck on posts along railway lines in France. People eager to see the fields and forests, as they roll through the country, complain that their views are intercepted every quarter of a mile or so by some huge advertisement setting forth the virtues of special absinthes, medicines, or tonics. In some instances the ordinary zinc-plate on posts is replaced by an enormous bottle, which destroys the effect of picturesque Norman, Breton, or southern villages. The objections to these advertisements became so numerous that the Council General of the Seine passed a resolution on the subject, and hoped that the railway companies would act in the matter in a manner likely to give satisfaction to the protesting public. Consequently the directors of the Orléans Line have sent out a circular directing all the tradespeople who have advertisements along the company's railway from Paris to Bordeaux to remove the same within a month. It is now hoped that other companies will follow this example, but it remains to be seen if the northern, western, and minor lines will display so much alacrity as the Orléans company in stopping a considerable source of revenue.—Paris Correspondence of the London Telegraph.

A model of the cathedral of St. John the Divine has been under construction for the past two years. It will be a miniature building, 50 by 25 feet, with a height of 35 feet. It is on a scale of an inch to the foot. The structure will be built of plaster, and a wooden frame will accommodate over a hundred persons. It is to be exhibited on the site of the cathedral, and possibly inside of a temporary structure. The work upon the cathedral proceeds slowly.

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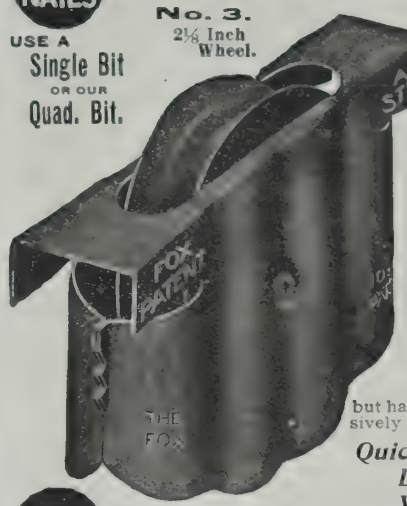

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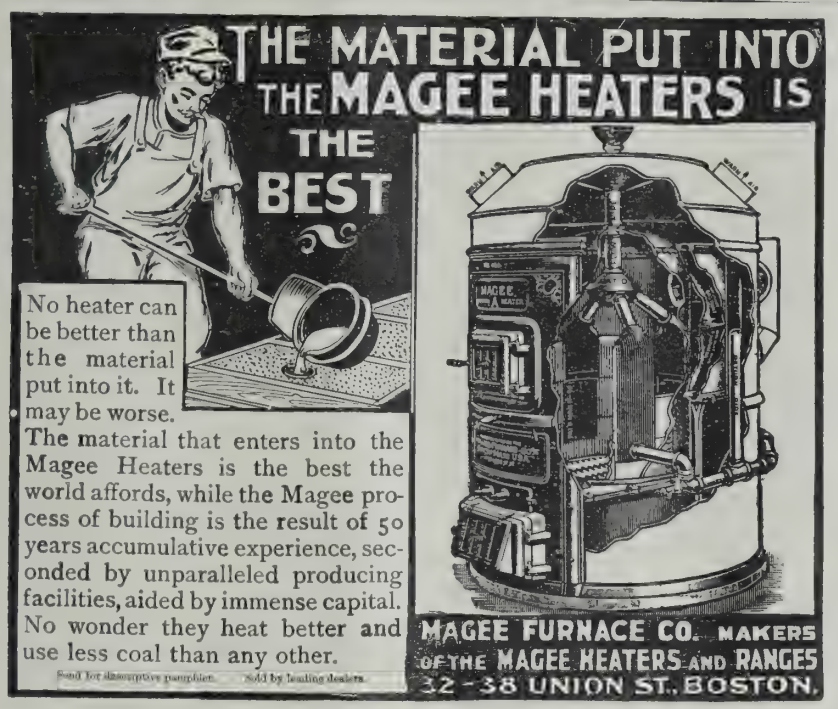

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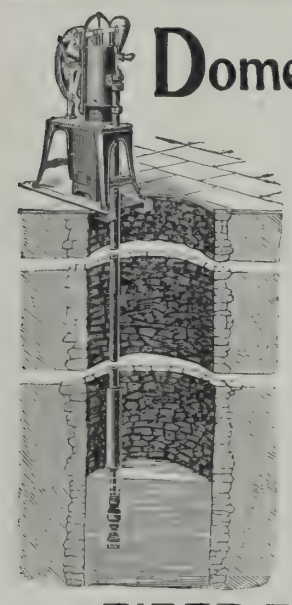

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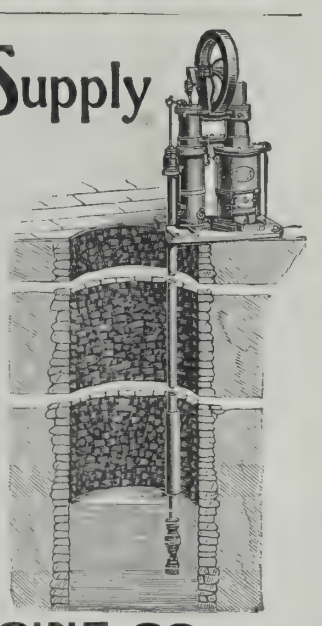

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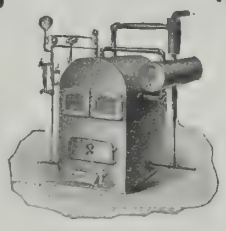

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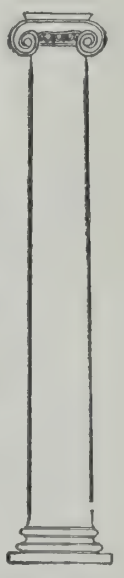

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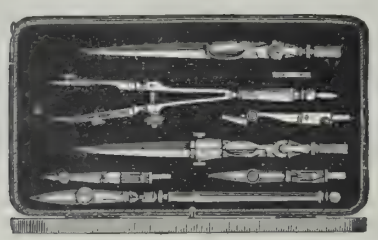

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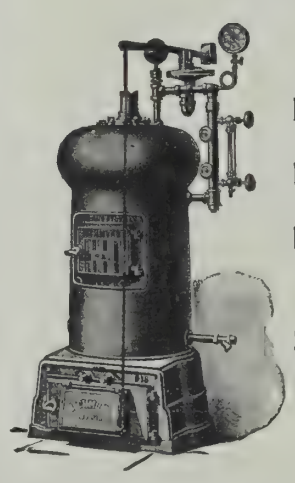

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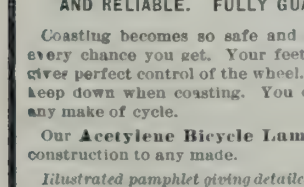

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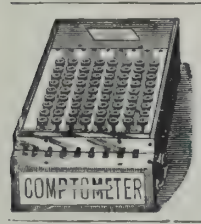

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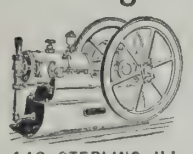

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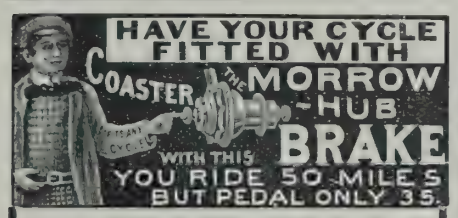

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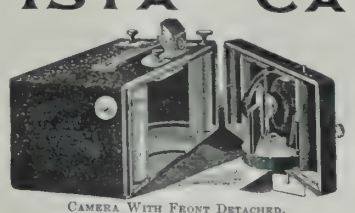

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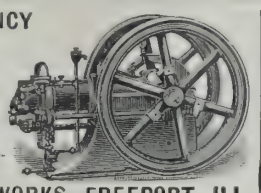

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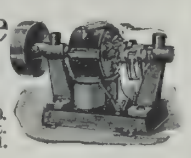

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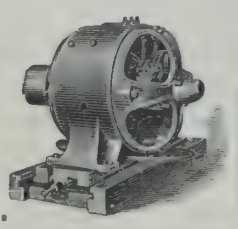

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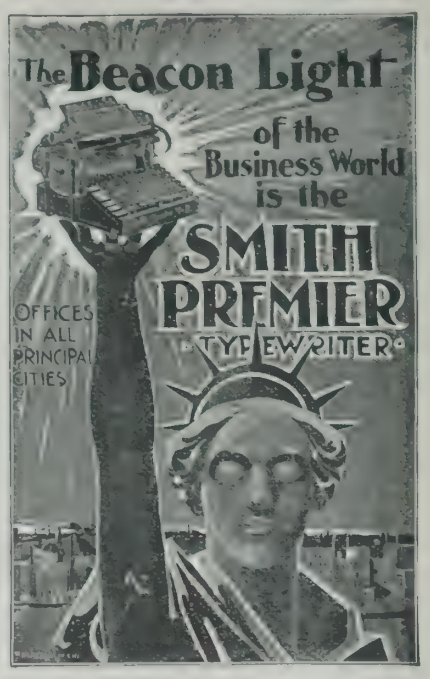

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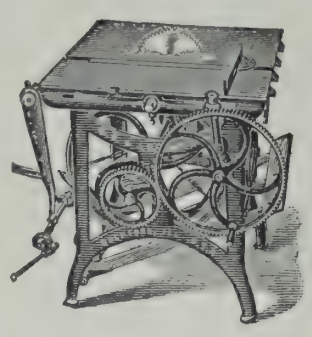

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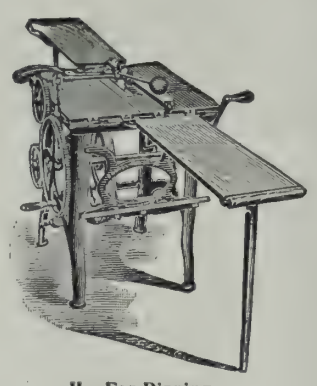

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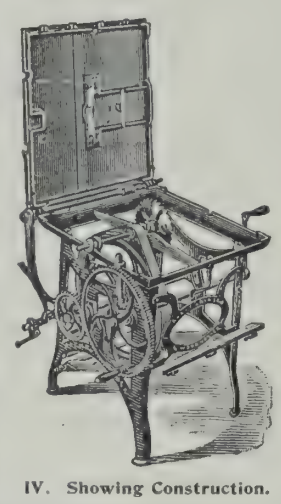

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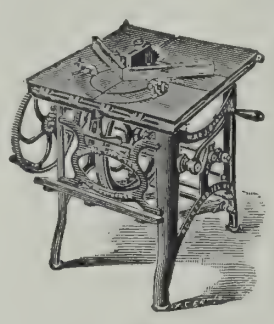

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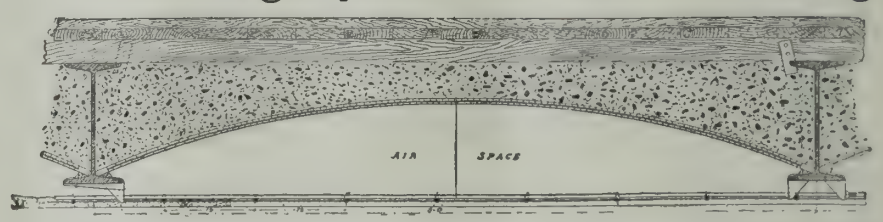

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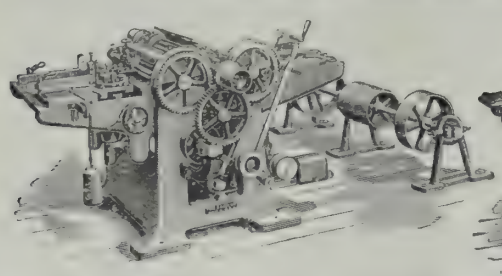

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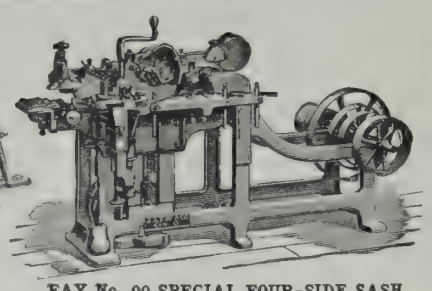

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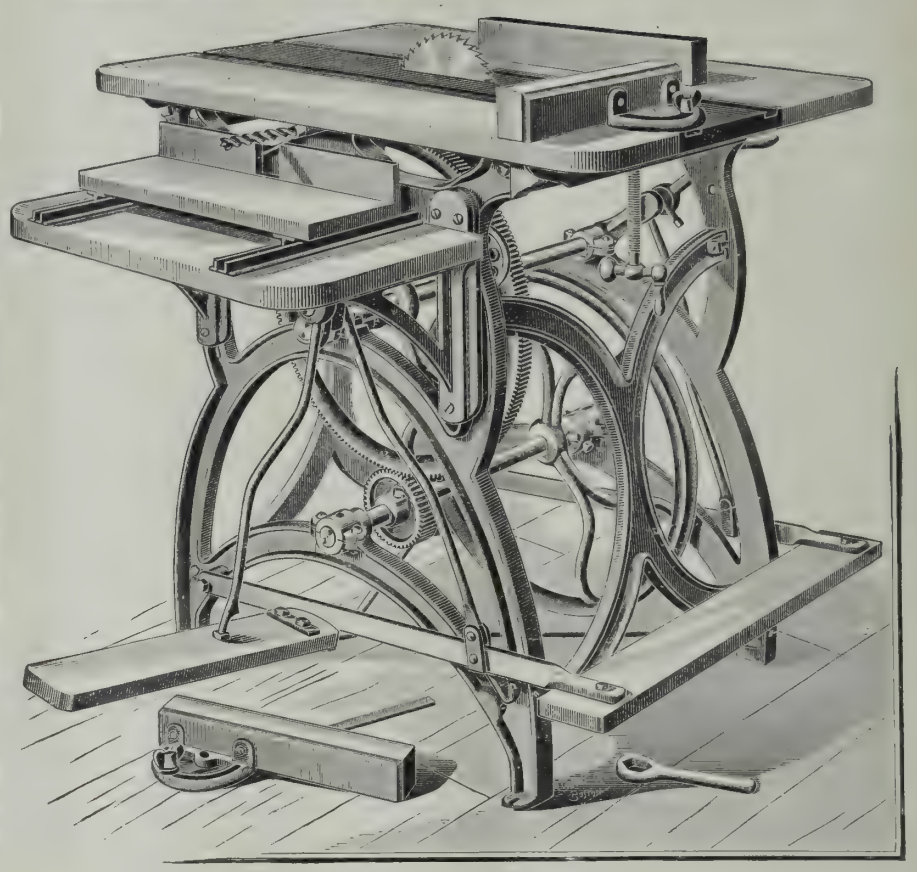

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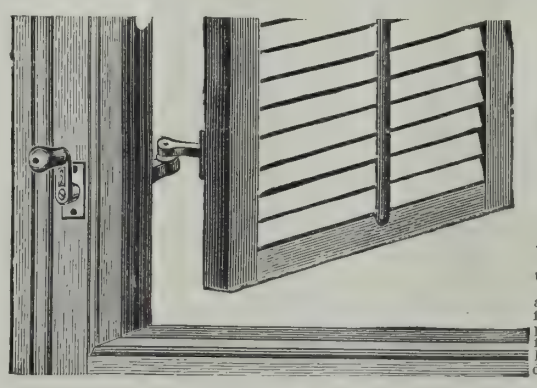

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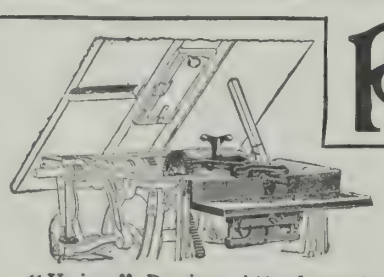

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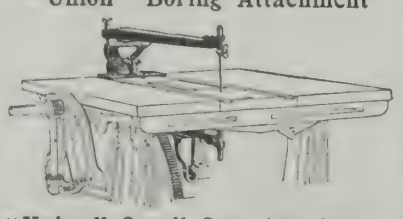

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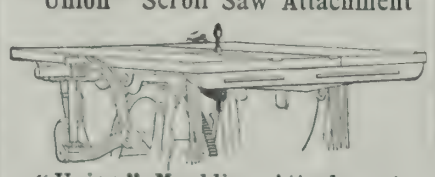

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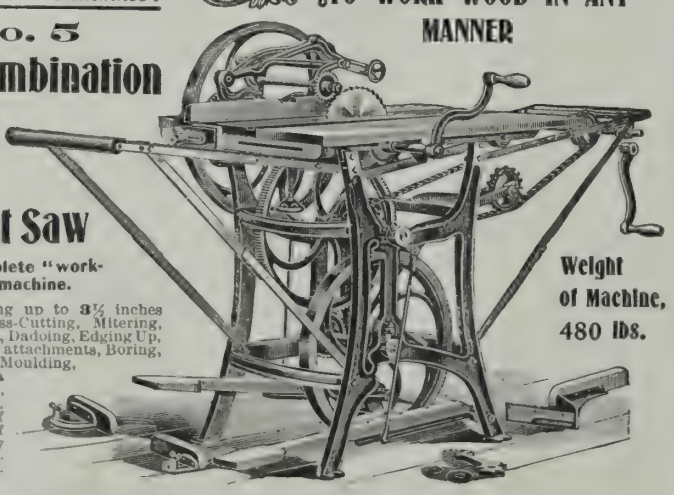

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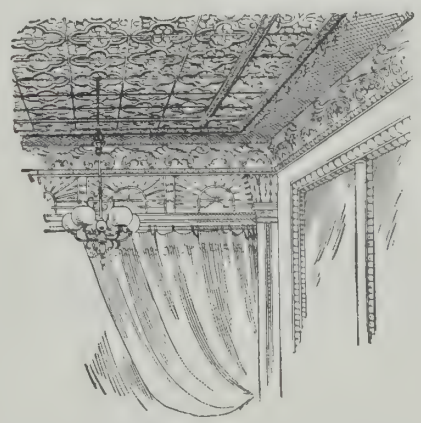

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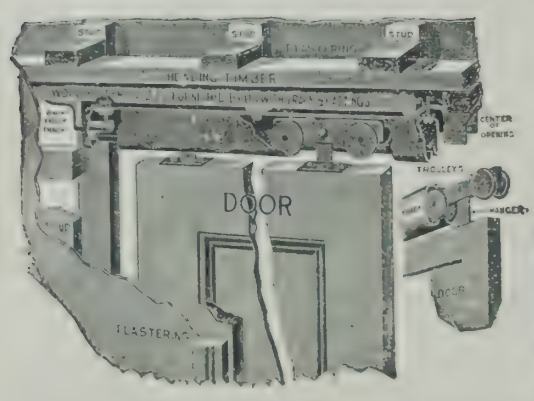

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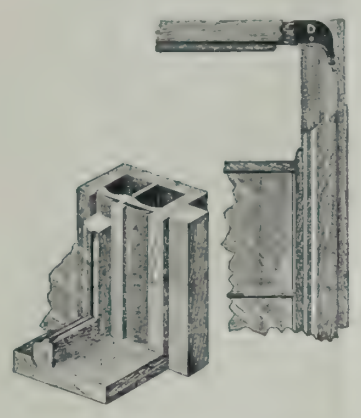

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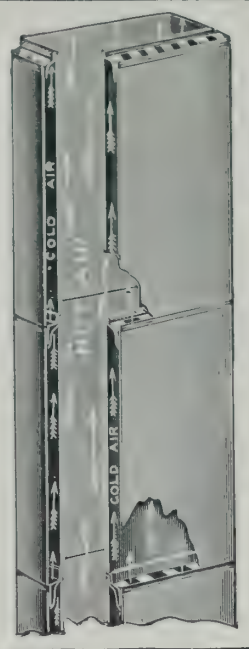

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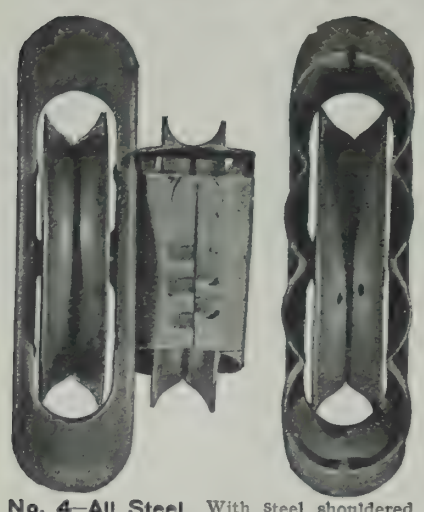

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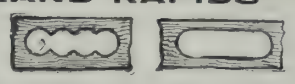

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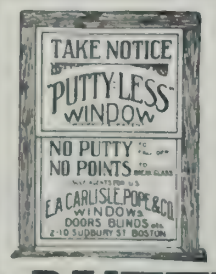

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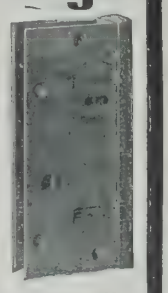

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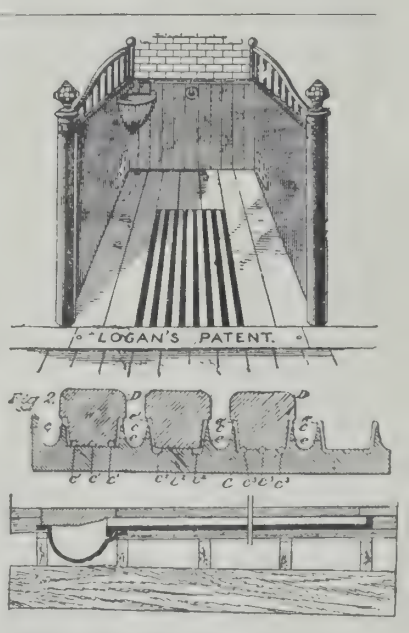

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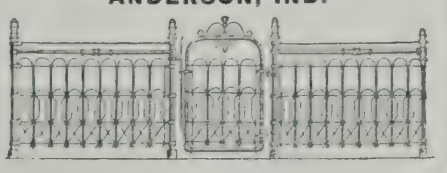

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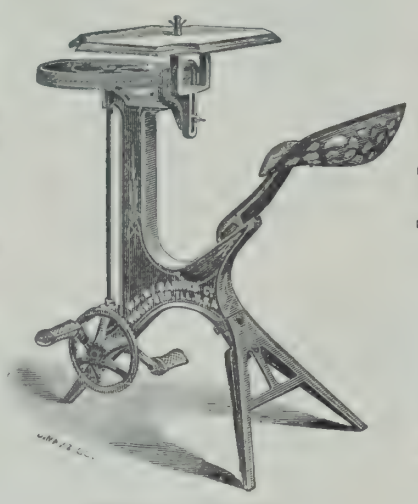

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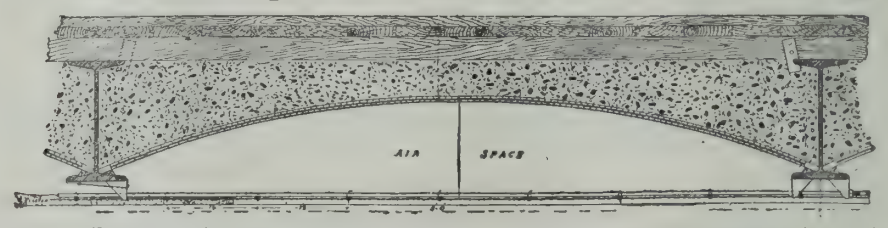

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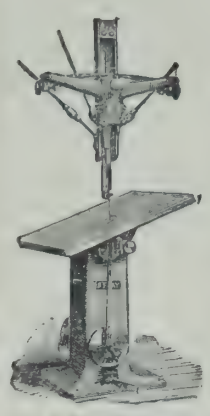

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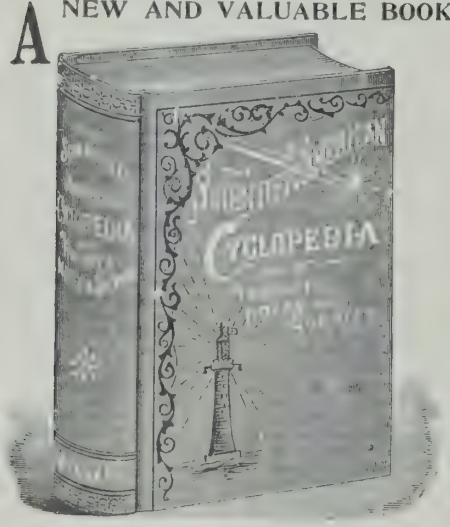

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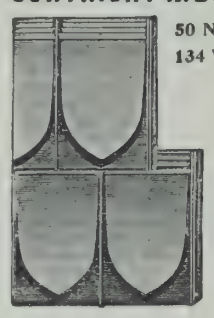

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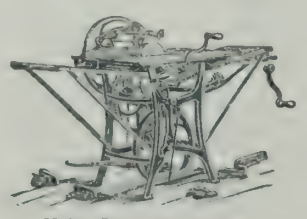

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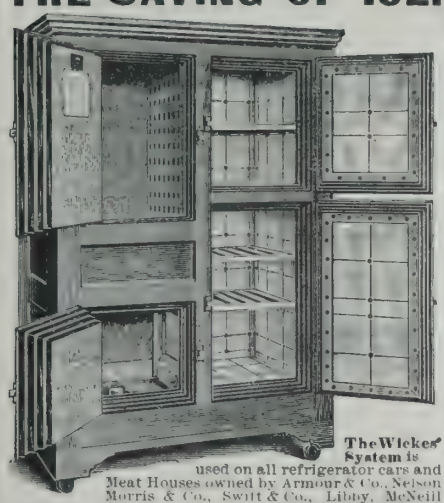

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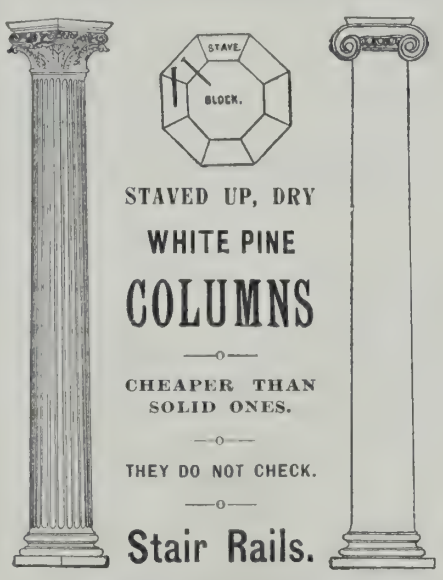

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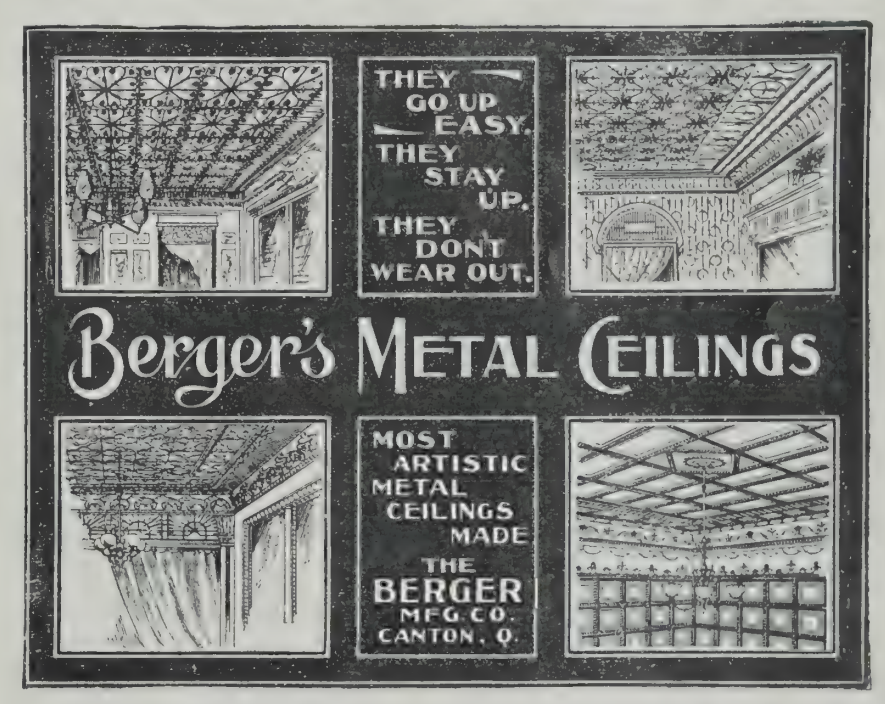

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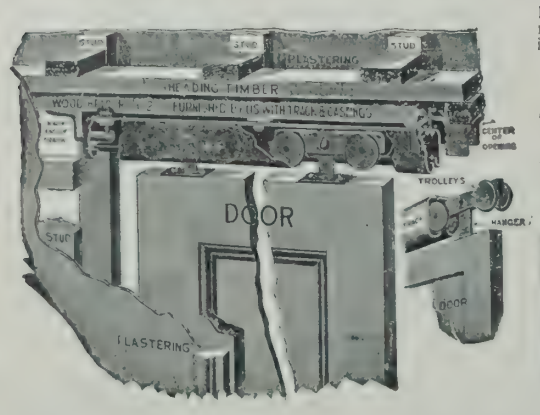

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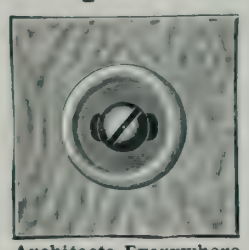

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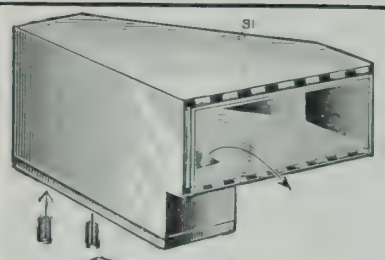

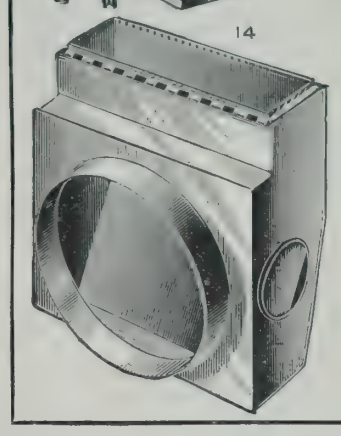

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Life and **Death**

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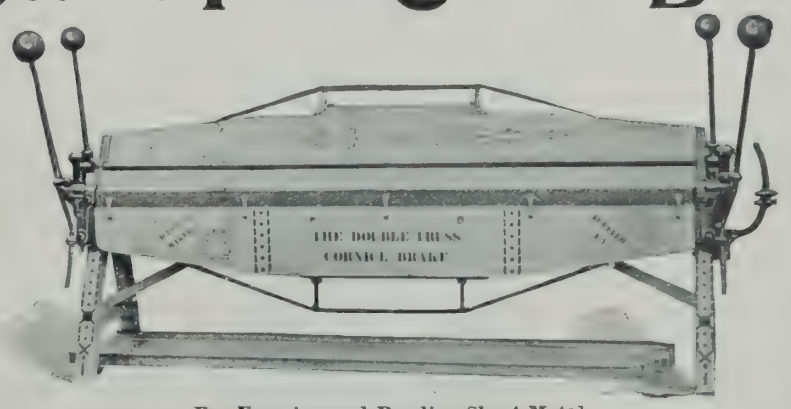

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FENCES AND RAILINGS.

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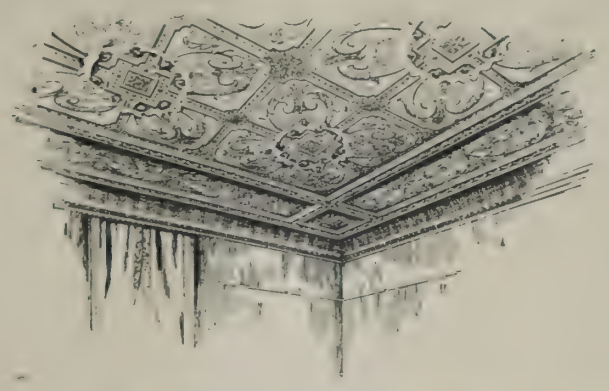

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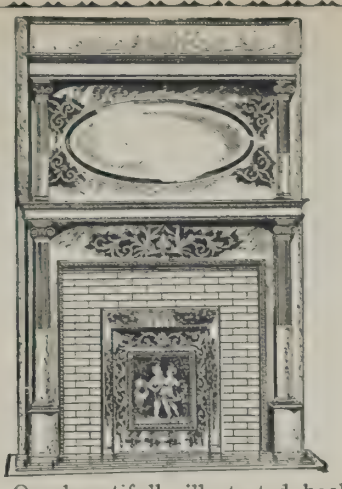

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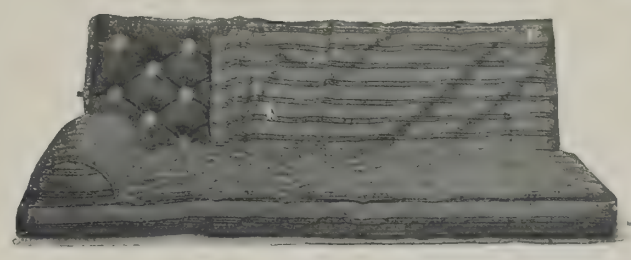
"CARRY YOUR BED IN YOUR GRIP!"



CAMI BEDS.—One with pillow attached, and so arranged that bed and pillow are inflated separately; the other is an ordinary Camp Bed, with tick pushed back in order to show the Air sac.

When you are hunting, fishing, mining or prospecting, you can secure luxurious comfort and sound sleep, and be certain of avoiding dampness and consequent rheumatism by taking with you the

KLONDIKE SPECIAL

"Perfection" Camp Mattress.

Made of stout white cotton duck, heavily coated with a pure rubber compound and vulcanized. It is inflated to any degree of elasticity required. Inflating apparatus goes with each. Out of use it is light, compact and portable. In use it is a comfortable bed on land, and a life raft on water. Durable, healthy, non-absorbent. No camping or mining outfit complete without it. Luxurious, yet inexpensive. The American Line Steamships "St. Paul" and "St. Louis" have used these mattresses nearly three years. All sportsmen, miners and prospectors should have one. Send for free illustrated price catalogue to

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Steam, Hydro-Carbon, Electric and Pneumatic Motors.

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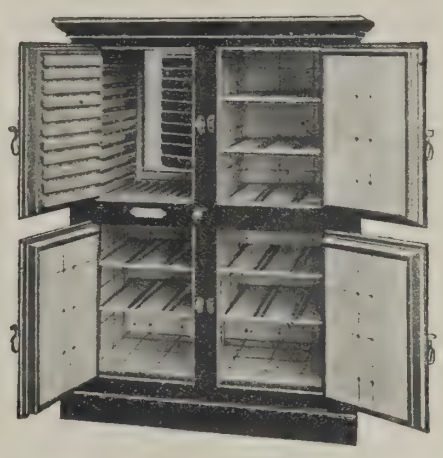

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48 inches wide. 28 inches deep. 63 inches high.
Built for F. MELVILLE LEWIS, Editor of "Hotel Life," Cleveland, Ohio.

ODORLESS WOOD AND TILE-LINED.

BUILT TO ORDER

For Residences, Clubs, Hotels, Public Institutions, Markets, Grocers, Etc.

Also a Complete Line of Stock Sizes.

This illustration shows a Refrigerator built to order for F. Melville Lewis, Cleveland, Ohio. It is tile-lined and has an ice door in the rear to be iced from the outside of house.

This Refrigerator is provided with a coil of block-tin pipe in the ice chamber which is terminated with a faucet seen in this engraving, and is arranged to be connected with water works or with a water filter placed above the refrigerator, thus providing a continuous supply of cold drinking water.

REFRIGERATORS LINED WITH ZINC ARE DANGEROUS.

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The McCray Perfect Ventilating Refrigerators are made to order in all sizes, from the smallest to the largest, and for any purpose required.

All Work Guaranteed Absolutely Satisfactory.

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Our Combination Window Frame Machine does all the work shown in cut. Makes the Pockets, lets in the Sash Pulleys and has a good Dado and Saw Table.

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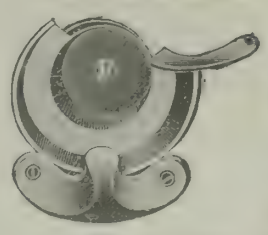

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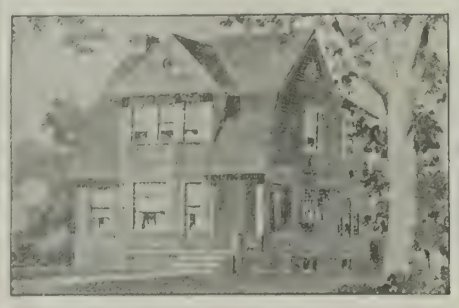

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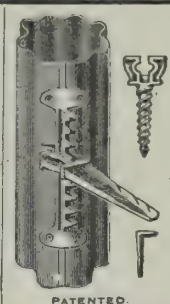

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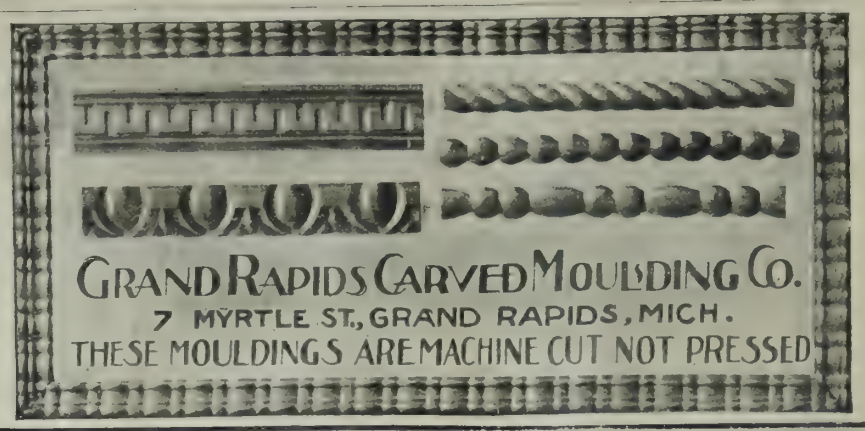

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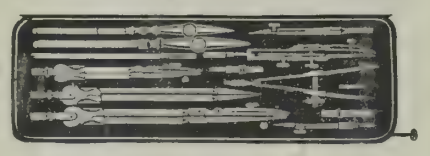

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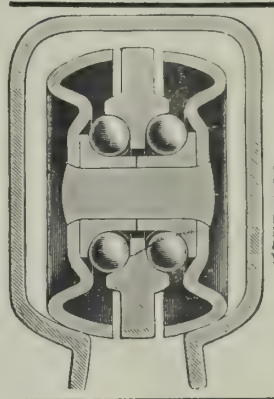

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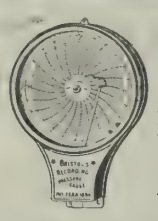

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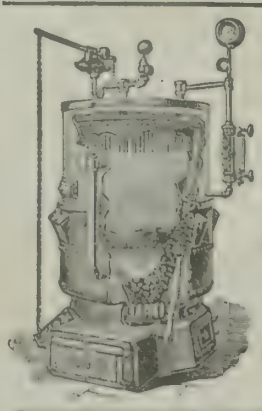

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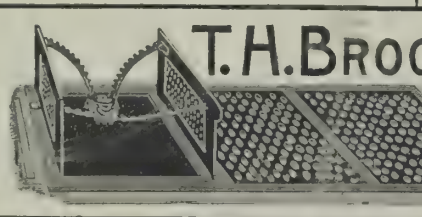

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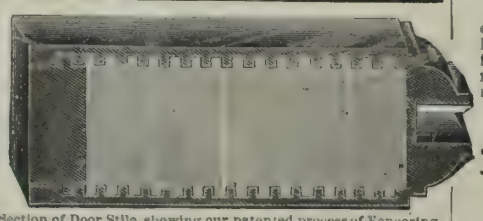

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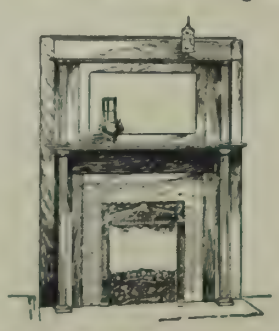

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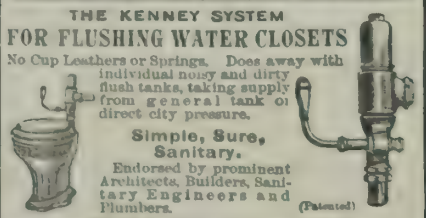

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